

ACORN USER

For the BBC micro, Atom and Econet users

November 1982 £1

Simple machine code

Software for schools

Atom Graphics

Hints and tips

BBC news



TREK III

Space war game

page 15



WIN A BBC MICRO page 71



A bigger range than the Himalayas



The Acorn Atom From £118 plus VAT.

Personal Computing – Instructional and Fun

To get the best out of personal computing you need two things—hardware that is powerful and reliable—software that uses the hardware to the full. The Atom range is just that. **The Atom—tried and tested.**

The Atom—tried and tested

The Atom was designed to last – inside and out. Outside a rugged, high impact case with a proper keyboard. Tested to withstand children as well as adults. Inside a powerful operating system that will never be bettered. It is available in several versions so you can choose what you want. And there is an enormous range of additional boards that fit inside the casing – start where you like – add more power, more versatility when you need it.

The Accessories – something for everyone

everyone Diskpacks, printers, monitors, plug-in ROM's, manuals, other languages, arcade-type games, business and household software. Whatever you want to do - teach your children, run your business - you can't do better than choose the Atom range.

Available Nationwide

Not just mail order, the Atom range can be bought through a national dealer network - they will help and advise you. And in the unlikely event of breakdown they will be there. Like our equipment Acorn Computers are here to last.

Acorn Computers Limited,
Fulbourn Road, Cherry
Hinton, Cambridge CB1 4JN
Tel: (0223) 245200.

FREE Catalogue

FREE Catalogue
For full details of the complete range and a list of dealers just fill in the coupon or write to us.

To: Acorn Computers Ltd,
Fulbourn Road, Cherry Hinton,
Cambridge CB1 4JN Tel: (0223) 245200.

Please rush me a complete list of the Atom range.

Name: _____

Address:

1

• 100 •

Postcode:



CONTENTS

ACORN USER

Monthly

NOVEMBER 1982, NUMBER FOUR

Editor
Tony Quinn
Managing Editor
Jane Fransella
Sub-editor
Ann Nimmo
Production
Susie Home
Marketing Manager
Paul Thompson
Promotion Manager
Pat Bitton
Editorial Secretary
Jane Lake
Publisher
Stanley Malcolm
Typesetters and
Designers
GMGraphics
Graphic Designer
Phil Kanssen
Printed in Great Britain
by E.T. Heron & Co. Ltd.

Editorial
01-631 1636
Advertising Agents
Dealer Deals Ltd
20 Orange Street
London WC2H 7ED
01-930 1612

Published by
Addison-Wesley
Publishers Limited
53 Bedford Square
London WC1B 3DZ
Telephone: 01-631 1636
Telex: 881 1948
ISSN: 201-17002 7
©Addison-Wesley
Publishers Ltd 1982

Subscription Information
For UK Subscriptions, send
your cheque or postal order
made payable to Addison-
Wesley Publishers Ltd to:
MAGSUB (Subscription Services)
Ltd, Ground Floor Post Room
Oakfield House
Perrymount Road
Haywards Heath
West Sussex RH16 3DH

Annual subscription rates
UK £15
Europe £18
Middle East £20
The Americas and Africa £22
Rest of the World £24

- 2 Editorial**
Tony Quinn
- 3 News**
- 10 BBC update**
David Allen on the new TV series
- 12 Simple machine code**
John Ferguson and Tony Shaw lead the way
- 16 Beeb Forum**
Ian Birnbaum tackles programming problems
- 19 Trek III**
Star wars by Tim Heaton
- 26 Schools**
Fishy graphics by Robin Norman
- 29 Graphics recipes**
Windows, by teacher Jane Whitwell
- 32 Multiple program storage**
Michael Murray has it taped
- 35 Hints and tips**
Joe Telford speeds up graphics and moves on to games
- 46 Printing on an Epson**
George Hill's seven-tone dump
- 48 User group news**
- 51 Atom graphics**
Paul Beverley on manipulation with machine code

How to submit articles

You are welcome to submit articles to the Editor of *Acorn User* for publication. *Acorn User* cannot undertake to return them unless a stamped addressed envelope is enclosed. Articles should be typed or computer written. Black and white photographs or transparencies are also appreciated. If submitting programs please send a cassette or disc. Listings should not contain more than 39 characters per line for ease of reproduction. Payment is £50 per page or pro rata. Please indicate if you have submitted your article elsewhere. Send articles, reviews and information to: The Editor, *Acorn User*, 53 Bedford Square, London WC1B 3DZ.

Coming soon in *Acorn User*:

- Sound on the Beeb
- Software reviews
- Atom word processing
- Maths in Basic
- Programs for schools
- Progress at the BBC
- Festive hints and tips
- Econet details
- Listings for games
- Teletext graphics



Cover design by Chris Gilbert

Constructive approach to the problems of computing



Acorn Computers Limited

Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN Telephone 0223 245200 Telex 817875 ACORNG

Dear Readers

"Acorn User" is being published to provide our customers and potential users with accurate information on all aspects of Acorn products, including the BBC Microcomputer System, Acorn Atom, Legnet and materials from Acornsoft, our Software House.

We have entrusted the publishing of this magazine to Addison-Wesley, who, with their reputation in computer publishing, should bring to it authoritative comment and articles on microcomputer activity. The magazine will not be limited by Acorn either editorially or in the advertising content, to ensure readers receive a truly balanced view.

Elsewhere in this issue the reader will find current information on the availability of existing and new equipment and software, in addition to details of service and upgrading facilities. In future issues you will be kept apprised of the latest technical developments.

Yours faithfully,
ACORN COMPUTERS LTD

H. Hauser
C. J. Curry

H. M. Hauser
C. J. Curry
Joint Managing Directors

Directors: H. M. Hauser PhD (Austria), C. J. Curry, A. Hopper PhD Registered No: 1403810 VAT No: 215 4002 20

TO THOSE of you who have never seen a copy of *Acorn User* before - welcome. You are reading the only magazine for users of the Atom, BBC microcomputers and Econet systems which has official support from Acorn Computers.

Acorn User is relatively new - it was launched in July - and this is the first issue to be distributed nationwide. Its role is to help you squeeze the best from your micro (and help you get one), as well as providing news of the latest developments from Acorn, the BBC and any other sources which are relevant.

The word 'users' is meant in its widest sense as readers come from all worlds - education, business, industry, home - and many countries. So whatever your interest, there should be something here, if not let us know.

Commentators in the media have had a field day with their criticism of Acorn - much of it deserved. But this magazine aims to provide a constructive side to its criticisms. Feedback presented in a proper way is valuable both to writer and target.

This effect is appearing in Acorn's attitude to its new, mass market microcomputer - the Electron. Hopes of a Christmas launch have now been dashed, and the company is delaying the launch to avoid production

difficulties which bedevilled the BBC machine.

Anyway, less of all this theory and back to the interesting bits. David Allen is providing this month's article from the BBC on progress with the new TV series. But making programmes, just like building micros is all in the production, and serious filming won't start till early November.

Meanwhile, one of Auntie's offshoots, the Ceefax service, is preparing to launch telesoftware. Buying a receiver will enable computer users to download programs broadcast over the airwaves directly into the memory of their machines, and save them on cassette or disc. Imagine it, no more keying in! Prestel has also set up a computer database to provide a similar service, with the might of Buzby's British Telecom.

On the educational front, teachers are still faced with a dearth of software. As BBC micros spread through schools financed by the Government's microelectronics scheme, the need for decent programs will become more apparent. *Acorn User* hopes to remedy the situation by acting as a medium for ideas and printing listings.

That's all from the Editor for now, see you in December.

©MCMLXXXII Walt Disney Productions world rights reserved



Acorn-Disney link up

British company joins forces with US film giant in schools competition

TRON, the science fiction adventure film, is the foundation of a major link up between Acorn Computers and American entertainment giant Walt Disney Productions.

A competition based on the film has been produced for primary and secondary schools in Britain - with BBC micros as the major prizes.

Acorn are offering a BBC microcomputer with disc drive, printer and software as first prize. There will be further awards given for regional entries.

But entrants need not already have a computer. All primary children need to do is describe the plot in 100 sentences of 10 words or less, while secondary pupils must write a story based on *Tron* laid out like a computer program.

Details are now being sent to schools.

At the risk of giving it all away, the story tells how Flynn, a programmer, has

his video games stolen by a powerful computer company. In his attempts to find proof of the theft, Flynn is drawn into a computer.

This fantastic electronic world is controlled by the Master Computer Programmer, who sentences Flynn to death by combat in the very video games he wrote in the outside world.

However, a mighty video warrior called 'Tron' comes to his aid in the battle

against the MCP.

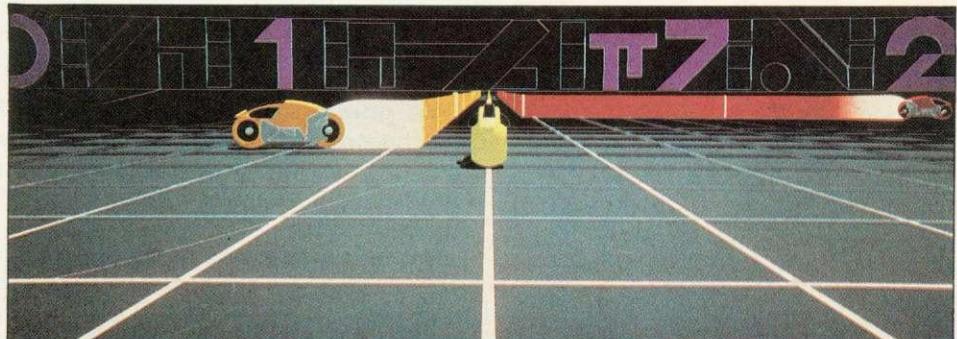
Much of the action takes place on light cycles, shown below. These leave a wall of energy behind them, which the riders use to try to trap their opponents. The machines travel at blinding speeds, and collision with one of these energy walls means death.

Tron lasts over 100 minutes, and makes extensive use of computer

graphics. Disney spent over \$20 million making the film - a quarter of this on the 15 minutes of wholly computer-generated sequences.

Unlike *Star Wars*, which used models and moving cameras to create battle scenes, *Tron* uses computers - with spectacular results. As the film's director of special effects said recently: 'It reminds you of something you have never seen before.'

©MCMLXXXII Walt Disney Productions world rights reserved



Computer-drawn light cycles play a deadly game



Electron launch delayed

THE Electron will not be available before the end of the year - that's the disappointing news from Acorn.

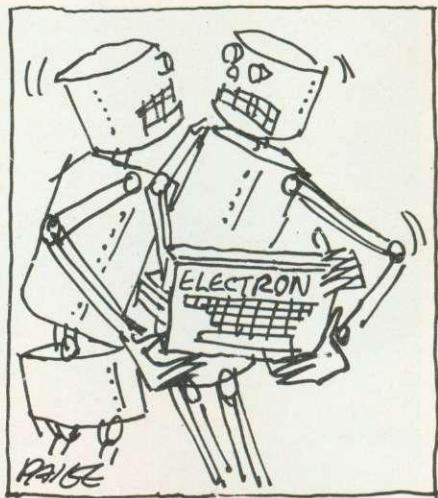
The company had hoped for a Christmas launch and the machine was on schedule a month ago - with just the ULA to be finalised. However, this chip was always the determining factor, as director Chris Curry said in last month's *Acorn User*.

The ULA is not ready for main production, and so the project is being re-scheduled for spring.

Acorn's £150 Electron is designed to compete with the Spectrum, and will use add-on modules to provide interfaces for Econet, teletext and printers.

Another project still in the pipeline is a microdrive. The first hints of this 3½" micro-floppy were seen in *Acorn User*, and Acorn are still evaluating prototypes.

Meanwhile, games paddles at £13 a pair are being despatched and production of the voice synthesiser ROM is underway.



Australian inroads

BBC micros are beginning to make inroads into foreign markets.

The machines have already been accepted for schools in three Australian states, Tasmania, Victoria and Western Australia.

Progress has been slow as output has been fully taken up with supplying demand in Britain.

The BBC plans to export its Computer Programme to countries which have shown an interest, such as Australia.

Reports in Australian newspapers claim the country has more networks in schools for Beeb machines than England. Britain is claimed to have just two!

Beeb teletext expansion

TELETEXT adaptors for the BBC microcomputer system are now in production.

These will give the computer the ability to decode Ceefax transmissions, and download and save software from the BBC. Hence users will not have to key in programs.

The receiver will cost £225, including VAT. It comes in a case about the size of BBC micro cut in half from front to back, and will be made from matching plastic.

With each adaptor, a ROM is supplied to be fitted to the model B which contains the interface software to make the computer operate as a conventional Teletext receiver. It also allows the computer to receive programmes which may be loaded and

run in the computer, ie telesoftware. This chip will be fitted by dealers.

Within the case are contained a television tuner section, digital circuitry for teletext acquisition and a power supply. There is a mains lead and TV aerial connector on the rear panel and underneath the front of the case a cable joins the 1MHz bus connector on the model B.

On the rear panel, four controls each offer a tuning range over the UHF TV channels E21 to E69 (470MHz to 860MHz). A tuning aid program in the teletext software gives a graphic representation of tuning condition when setting up these four channels. Once adjusted at a particular user site no further tuning is required,

allowing selection from four pre-set frequencies.

For good reception, an external UHF TV aerial which is not fed to the adaptor via a cable distribution system is normally required. The computer is designed to guarantee a teletext decoding margin in excess of 70% (50% would normally be sufficient).

Digital circuitry within the adaptor receives TV lines of teletext information every field period. Up to eight lines (320 characters), may be received in each period, although only two lines of teletext per field are being broadcast at present. In the UK with a TV field frequency of 50Hz, this means that the adaptor has an input data rate of 128k bits per second. (There is provision within the hardware for extension to 16 lines.)

After the teletext lines in each field, the adaptor interrupts the BBC micro and passes the teletext data received to the computer. If these lines are required to build up teletext page the computer is trying to acquire, they are stored, otherwise they are ignored.

The BBC microcomputer contains a full implementation of the teletext, including upper and lower case characters, colours, separated and contiguous graphics, double height and flashing characters.



Beware of adverts

SEVERAL readers have contacted this magazine to complain of delays in ordering products related to Acorn machines. Frustration has been further exaggerated by permanently engaged telephones.

The golden rule seems to be: buy it over the counter, or check it really is in stock before ordering by post. Reputable companies will be pleased to provide advice.

One company has been advertising BBC teletext and Prestel receivers as 'in stock' since September. In fact, the first is only just becoming available and the second isn't even in production.

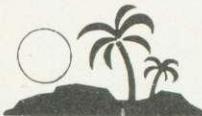
Software for all

72 NORTH STREET, ROMFORD, ESSEX. TEL 0708 60725

FOR THE BEST IN **BBC** SOFTWARE

Zombie Island

For 32K.



Fight for survival on an island inhabited by hungry, dangerous cannibals. Basic and machine code program

£7.95



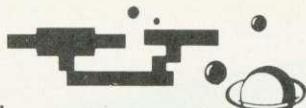
For 32K

Fast arcade style action game with hi-res colour & sound. Machine code

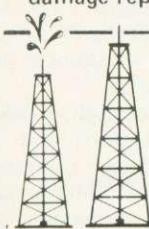
£6.95

BEEBTREN

For 16/32K, real time advanced Startrek Game.



£7.95



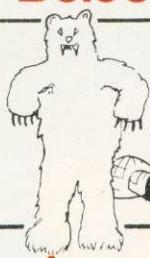
For 32K only. Two player game, features include exploration, drilling, employment and Price Wars.

£6.95

J.R.

NEW **POLAR BEAR**
For 32K
Educational game for 8-12 year olds. Incorporating simple maths tables.

£7.45



NEW **Space Kingdom**



For 32K
Travel round the universe capturing & colonising star systems to become galactic ruler.

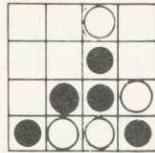
£7.95

Send large SAE

for a catalogue of our complete range

**SEE US ON
STANDS
437/438 AT**

THE
Northern
Computer
Fair
Personal computers
Home computing
Small business systems



For 32K

Row of 4

Try to outwit your computer opponent in this game of skill. Great graphics. Basic and machine code.

£6.45

TIME TRAVELLER

For 32K only.

Travel through over 100 rooms in different times, and find the key back to your own time.



£6.95

Utility Pack 1



For 32K
Envelope program/variable print/
Text Scanner/Hex Dump

£7.45

Utility Pack 2



For 32K
Disassembler/Program Crunch/
Text Editor

£7.45

CAR WARS/ ALIEN PLANET



For 32K
Two Graphic games
Good Graphics
both Basic & Machine Code.

£6.95

Please send me:-

Add £1 p&p per order.

£

£

£

£

I enclose Cheque/P.O. for

Please debit my
Access/Barclaycard No.

Name

Address

Make cheques/P.O. payable to: SOFTWARE FOR ALL
72 North Street, Romford, Essex.
Tel: Romford (0708) 60725



Shrinking micros

THIS little chap is straight from a toy sports car. But what's he doing inside a microcomputer? That question will be answered by BBC TV's new computer series, which begins filming in November.

The plan, apparently, is that Ian McNaught Davis - 'Mac' - is going to do for the inside of computers what David Bellamy did for back gardens.

It is just one of many ideas being tried out for the new programmes which will be shown in the New Year.

David Allen, the producer, gives the lowdown on some of the plans he has on pages 10 and 11. Meanwhile, you'll just have to be content with repeats of the *Computer Programme* on BBC1, Sundays and Mondays.



Black box hooks up to robots

GIVING micros power over robots is the role of the black box pictured here.

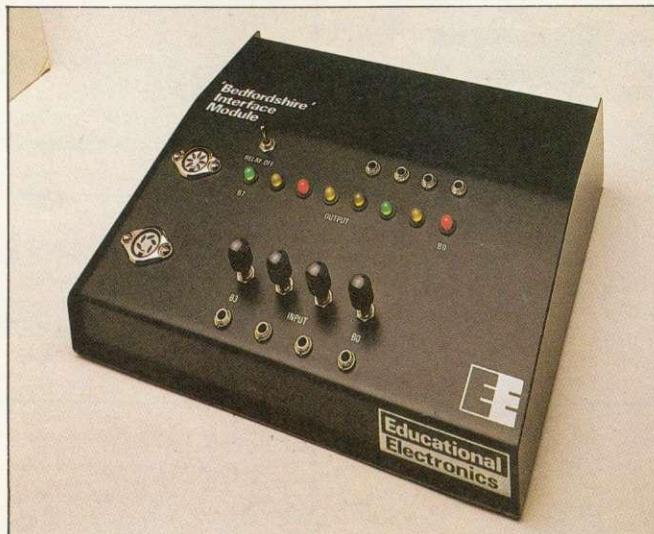
The Bedfordshire Interface Module is designed to drive hydraulic and pneumatic valves, motors, and solenoids used in robotics.

Any micro with an eight-bit user port is suitable for the interface, which has served a year's apprenticeship in a mobile classroom.

Bedfordshire Education Authority's Technology Bus, (part of an A-level technology course), provided the test-bed.

Several other modules plug into the black box to provide joysticks, digital to analogue conversion or a speaker box.

Input to the module can be from four push-buttons on the front panel, or from microswitches, thermostats etc, connected via a 5-pin DIN socket or 3.5mm jack sockets.



The input signals go via a Schmitt trigger circuit to remove any noise and then on to opto-isolators. This ensures the computer input port is not damaged by inadvertent connection to

high voltages.

Its makers, Educational Electronics can provide more information:
30 Lake Street,
Leighton Buzzard,
Bedfordshire LU7 8RX.

Network brains ring the changes

ORBIS, the brains behind the Cambridge Ring have joined forces with Seel of Edinburgh to produce local area networks.

The Edinburgh company will manufacture and distribute Orbis products, including the 16-bit network processors, based on Motorola's 68000 chip.

Co-operation between the two has already resulted in successful installations at Cambridge University, Rutherford and Appleton Laboratories, British Telecom Research and ICI.

Under the agreement, 68000 network systems will be supplied with Mace high speed intelligent network interfaces, providing on-board protocol software, up to transport layer (level 4). A range of Mace host adaptors, initially to Vax, PDP-11, Prime and GEC 4000 machines are also under development.

For their part, Seel will make available their range of interrupt-driven interfaces eg Multibus, Q-Bus and S100 together with network nodes, conforming to the new CR82 British standard.

Orbis is part of Acorn Computers, and details of the network systems are available from Peter O'Keefe on (0223) 312449.

Dealer list

THERE are several changes to the dealer list on page 72, which we were unable to include.

The Microstore, London SW3 is not answering its phone and appears to have closed down.

Also the Typewriter centres in the Midlands are no longer Acorn dealers.

Micro knick-knacks

ALL sorts of weird and wonderful things are popping up to add to your Acorn micros.

Computer graphic design sheets (£4.95 for 100-sheet pad), decimal/hex scale rules (£7.95) and TV support stands (£29.50) are three of the latest products.

All are produced by Dracal Design Consultants, who will give bulk discounts

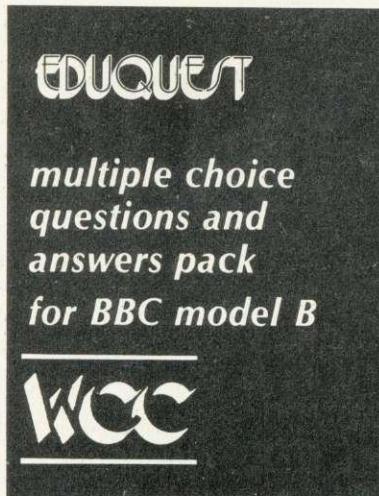
to schools and members of some user groups.

The graphic design pads come with photostated sheets giving details of setting up user-definable characters, with practical examples of producing aliens and UFOs.

Information from Dracal (North West) Ltd, PO Box 130, Warrington, WA1 4QB

EDUQUEST

THE PROFESSIONAL SOFTWARE PEOPLE



Multiple Choice Question & Answer Pack

- Specially designed for educational users
- For use with the BBC Model 'B' Micro computer
- £25.00 including VAT and P & P

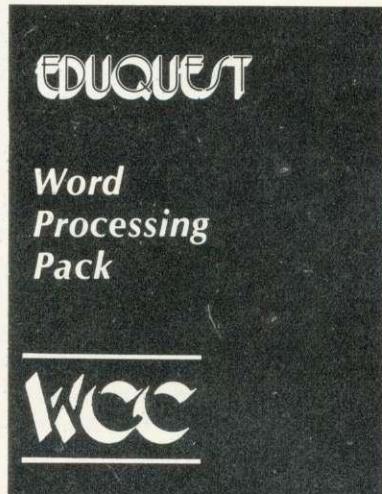
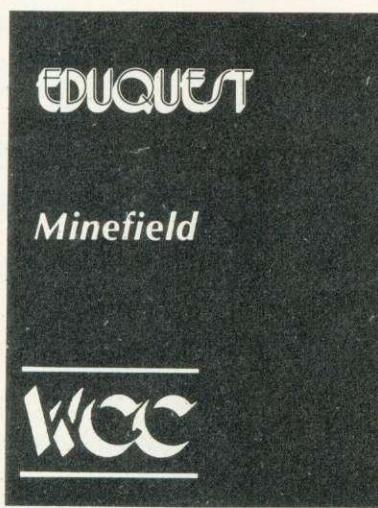
Pack Contains

- *Instruction manual*
- *Master input mode*
- *3 Reception modules, each display questions and answers in a format suitable for students of different abilities and age groups*
- *Blank tape for data.*

THE PACKAGE CAN BE USED BY STUDENTS FROM AGE 6 UPWARDS BY SELECTING THE MOST SUITABLE RECEPTION MODULE, IT MAY ALSO BE USED IN BUSINESS FOR APTITUDE TESTING AND IN THE HOME FOR EDUCATIONAL QUIZZES.

Word Processing Pack

- A simple to use tape-based word processing package
- Ideal for the small business or home user
- For use with the BBC Model 'B' Micro computer
- £10.00 including VAT and P & P.



Minefield

- An entertaining family game
- Try and cross the minefield without blowing yourself up!
- 3D graphics on Model 'A' and 'B'
- Only £7.95 including VAT and P & P.

TO: **EDUQUEST 1** Thames Avenue Windsor Berkshire SL4 1QP Tel: Windsor (07535) 58079

Please send me:

(Tick as required) Multiple Choice Pack
Word Processing Pack
Minefield Model 'A'
Model 'B'

I enclose cheque for £..... or charge my Access/Visa/Trustcard Account No:

My Access Visa/VisaCard Account No.

Signature.....

Name.....

Address.....





Modelling aids for education

A RANGE of products which model engineering devices has been produced for the Beeb and Atom.

These modules mimic equipment such as washing machines or diesel generators, to give the user some idea of control and feedback techniques.

The range, called Mica,

is made by Feedback Instruments Ltd and designed as an aid in teaching robotics, environmental engineering and numerical control.

Applications modelled include: washing machine; stepping motor; diesel generator; temperature control; traffic control; binary

input/output.

There is also an electronics project board and multifunction input/output available.

Feedback Instruments also produce interfaces for the application modules. The company's address is: Park Road, Crowborough, Sussex TN6 2QR.

Free advice

INDUSTRIAL and business readers in the Sheffield area can lay their hands on a micro at an advice centre in the city.

The South Yorkshire Microsystems Centre will be run by Sheffield Polytechnic, and forms part of a network set up by the National Computing Centre.

Advice will be free, but more complex consultancy sessions will be charged for.

The address is Dyson House, Suffolk Rd, Sheffield S1 1WB. Tel: 0742 738621

Characters

USERS with an Okidata Microline M80 matrix printer can now buy a character generator EPROM which matches Atom and Beeb keyboard codes.

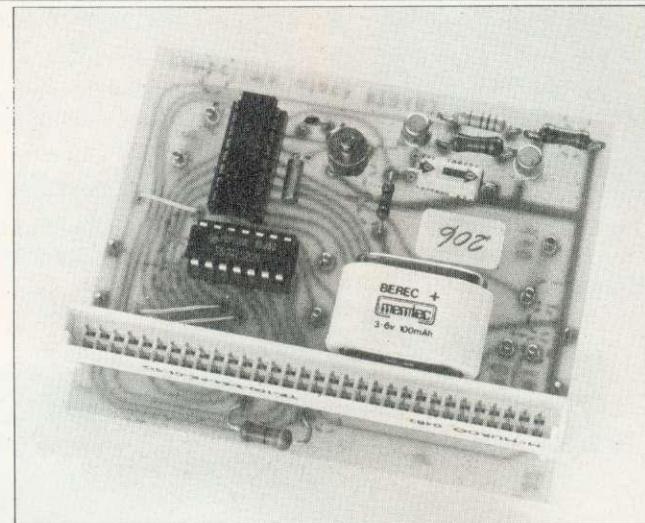
The generator has ASCII special symbols, slashed and unslashed zeros and costs £15 (plus VAT).

Computech, of 168 Finchley Road, London NW3 6HP, produce the firmware. They will supply the M80 and generator for £230 (plus VAT).

Beeb case

IF carrying your micro is a weight on your mind, special cases are available.

W.H. Hayden supply steel edged fibreboard cases at £34.95 (excluding postage and VAT). Details from 52 Holloway Road, London N7 8JL.



Time for the Atom

FOR those Atomists to whom time is of the essence, Varuna Electronics has produced a real-time clock and calendar.

The board fits inside the Atom's casing, and comes complete with its own battery for power when the machine is switched off.

Time and date are always available, and leap year calculation is automatic. Accuracy is claimed to be within one second a day at 20°C.

At £20 (inc postage and VAT), the clock comes with five sample programs and full instructions. Contact Varuna Electronics, Horsell Park, Woking, Surrey GU21 4LY.

Meetings focus on microcomputers

■ Microfest 82. December 11, 12. Repeat of exhibition held earlier in the year. Venue is UMIST in Manchester. Details from Richard Hewitt, Third floor, 121 Princess St, Manchester M1 7AG.

■ Development of new Teaching and Learning Methodologies, December

12-17, Bristol. Sessions on the BBC micro, December 12, 14. Fee is £82.50 including accommodation. Details from Registrar, Further Education Staff College, Coombe Lodge, Blagdon, Bristol BS18 6RG.

■ 'Can we use a desktop here?' Symposium of Institute of Chemical Engineers and

Acorns overseas

SEVERAL readers have asked about distribution of Acorn computers overseas. The following companies should be able to give details:

AUSTRALIA
Consolidated Marketing Corporation (Imports) Ltd
Melbourne 419 3033

BELGIUM
Computing & Electronics International NV
Antwerpen 32 08 09

DENMARK
Bergqvist & Hobberstad Eng. A/S
Copenhagen (451) 133188

FRANCE
J C S Composants Sarl
Paris 1 355 9622

HOLLAND
Compac/Acoustical BV
Kortenhoef (35) 61614

IRELAND
Lendac Data Systems Ltd
Dublin 372 052

ITALY
Iret Informatica
0522 32643/4/5/6

PORTUGAL
Datamatic
Braga 71555

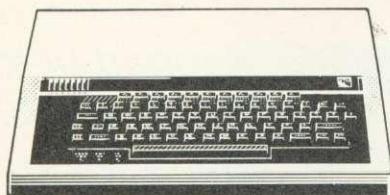
RSA
Durban 325 531

SWEDEN
Beckman Innovation AB
Stockholm 390 400

Society of Chemical Industry on use of personal computers in the process industries. Contact either organisation.

■ Expert Systems Tutorial, December 20, London. Fee is £40. Details from Richard Forsyth, Maths Dept. Polytechnic of North London, Holloway Road, London N7

BBC MICROCOMPUTER



BBC Model A £299	BBC Model B £399	— (these prices include VAT, Carriage £8/unit)
Complete upgrade kit £49.50	Installation £15	
Disc Interface ... £70.00	Installation £20	
Memory Pack 8x4816AP-3 £21.60	RS423 & VDU Port Kit ... £10.80	
Analogue Port Kit ... £ 7.30	Bus & Tube Ports Kit ... £ 7.50	
Printer & User Port Kit £ 9.50	DISC Interface... ... £70.00	
	BBC Single Disk Drive £235 + £6 Carr	
	Dual Disk Drive £799 + £8 Carr	

All mating connectors with cables available in stock - Wide range of ACORN SOFTWARE, BUGBYTE & PROGRAM POWER in stock

Single Disc Drive (SSSD 100K) £235 + £6 Carr Dual Disc Drive (DSSD 800K) £799 + £8 Carr
Single Drive Connector ... £ 8.50 Dual Drive Connector ... £ 12

Phone or Send for our BBC List of Books, Software, Peripherals, Etc.

ATOM Kit £120, Basic Built £135

Expended 12K+12K £175, 8K+5K+Colour Card £169 (£3/unit Carr)

Atom Upgrade to BBC £45, F.P.ROM £19, 1K RAM £1.80

Word Pack ROM £26 Tool Box ROM £25

All ATOM Buffers & Connectors in Stock

Atom Forth £10, Atom Lisp £15, Atom Calc £34

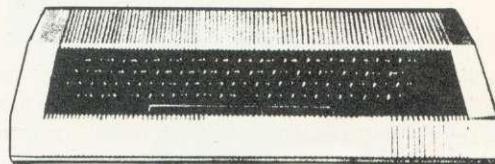
Monitor ROM for direct entry of Machine Code £16

Atom Disc Pack £299 + £7 Carr.

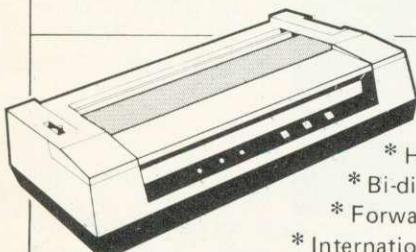
4 Eprom Selector Board £19.50

Phone or Send for our Atom List for full details

ACORN ATOM



PRINTERS



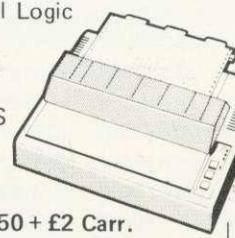
NEC PC8023 BEC

- * 80 Cols. 100CPS
- * Proportional Spacing
- * Hi-Res & Block Graphics
- * Bi-directional Logic Seeking
- * Forward & Reverse Line Feed
- * International & Greek Alphabet
- * Auto underline, Super & Sub Scripts
- * £340 + £8 Carr.

* MX80f/T £325. * MX100f/T £430 * Printer Cable £13.50
* 2000 Sheets 9½" x 11" £14 + £4 Carr. * 500 Sheets 9½" x 11" £4.50 + £2 Carr.

EPSON MX80 & 100F/T3

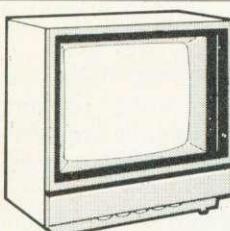
- * MX80: 80 Cols. 80 CPS
- * MX100: 136 Cols. 100 CPS
- * Bit Image Printing * Hi-Res Graphics
- * Bi-directional Logic Seeking
- * International Characters
- * 32 Print FONTS
- * Auto underline
- * Super & Sub Scripts



SEIKOSHA GP100A

- * 80 Cols. 30 CPS
- * Self Testing
- * Hi-Res Graphics
- * Standard & Double width characters
- * only for £180 + £6 Carr

Variety of Interfaces available in stock



BMC BM1401 Colour Monitor
RGB Input/Separate Video Sync.
£240 + £8 Carr

Lead for BMC Monitor £10

Microvitec 1431 Colour Monitor
RGB Input (Lead included)
£269 + £8 Carr.

MONITORS

BM12A 12" Green Screen Monitor
£80 + £6 Carr

Sanyo 12" Green Screen Monitor
18MHz - antiglare screen
£99 + £6 Carr

Computer Grade SANYO
Cassette Recorder
£24.50 + £1.50 Carr

Cassette Lead 7 pin

DIN-3 jack £3.50

7 pin DIN-5 pin DIN + 1
jack £4.00

Computer Cassettes C12 50p ea
or £4.50 for 10 + £1 Carr

BBC COMPATIBLE 5½" DISC DRIVES

All disc drives complete with built in PSU and housed in a cabinet with BBC matching colours

Single Drive: 100K £190 200K £255 400K £420

Dual Drive: 200K £360 400K £480 800K £750

Carriage: £6/Single Drive £8/Dual Drive

DISKETTES — in pack of 10's

SS40 Track Diskettes £15

SS80 Track Diskettes £22

Single Disc Cable £ 8.50

Dual Disc Cable £12

The above are just a few of the items from our large stock range. We carry a very wide range of connectors, made up cable assemblies, TTLs, CMOS, Microprocessors, Interface & Linear Devices, RAMs, EPROMs, CRYSTALS etc. Our price lists, catalogues, leaflets are available on request. Our large stocks enable us to effect same day despatch on most orders.

Orders from schools, colleges and educational establishments are welcome.

Please add 40p for P&P/Carr. unless stated otherwise and add VAT at 15% to the order value.

TECHNOMATIC LTD.

MAIL ORDERS TO: 17 BURNLEY ROAD, LONDON NW10 1ED

Tel. 01-452 1500/450 6597 Telex 922800

RETAIL SHOPS: 15 BURNLEY ROAD, LONDON NW10 305 EDGWARE ROAD, LONDON W2



ROBOTS GO SHOPPING

David Allen has stepped in to Paul Kriwaczeck's shoes to produce the second BBC computer series. Here he details the programme's progress, and some of the strange things that go on

If you're watching the latest repeats of the *Computer Programme* (Sunday mornings on BBC1) you'll maybe be interested to know how next year's series - *Making the Most of the Micro* - will build on what has gone before.

Originally, we conceived the *Computer Programme* as a 'hands-on' series concerned with 'how to do it'. Later we changed the philosophy because it became clear that what was needed was a series designed to explain the basic ideas of the wide world of computing to the general public - especially those with no experience of computing at all.

My colleague, Paul Kriwaczeck, achieved that elegantly in series one; it's now my job to produce a

Cobblers . . . 'Mac' shoes how it's done

series for micro-owners and the technically curious - a heterogeneous audience, but including those who, perhaps thought series one was simple and slow.

Of course, we've got to be careful: our ultimate business is to illuminate, stimulate and inform our audience. But that audience does not just consist of BBC microcomputer owners. Whatever machine you might have, and however much knowledge you have, the television series has got to appeal and have some relevance - even if it is simply reinforcing ideas which you already understand - perhaps explaining them in a new way. This has forced us to look hard at the fundamentals of using micros - at the common

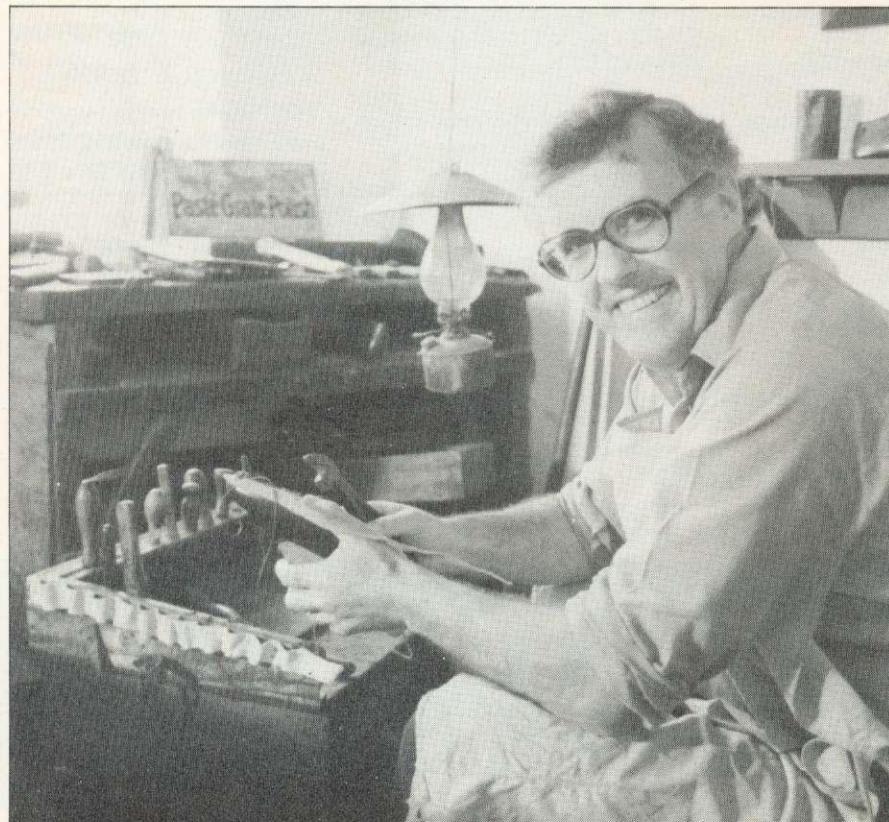
ground of personal computing.

Take writing programs in Basic. Many viewers will not want to know how to do this, and others will already have a much greater knowledge than we can put over. Nevertheless, we are going to show Ian McNaught Davis - 'Mac' - doing some coding in most of the programmes.

What matters to us and our advisors, in Programme 2, for example, is how to get across the idea of the main programming structures - that, amid all those parochial, machine-dependent techniques, there are only a handful of principles being applied. In showing this, BBC Basic is a great strength: long variable names, IF . . . THEN . . . ELSE, REPEAT . . . UNTIL and procedures make it so much easier to make a program clear to read - and that is important when we are trying to show these things on television.

If you are working on a machine with Atom Basic, Sinclair Basic or Pet Basic, the code will be different, but the programming concepts - which is what really matters - will be just the same. On the other hand it would be foolish to give details of how to format the screen on a particular machine - each is different. But it is useful to look at good presentation - for example, when to avoid the top line of the display, being consistent about the centering or aligning of lines, and so on.

As before, the use of analogy is important as a way to get ideas home. So, in Programme 2, writing a program in Basic is likened to ordering a meal in a Chinese restaurant. The order must be given in 'appropriate' language - and then translated into hieroglyphics





Waiter... is there any machine code on the menu?

by the waiter (microcode) which the kitchen staff act on using their own local rules unbeknown to the customer (system software) – unless, of course, he wants to run his own Chinese restaurant (eg write in machine code).

Later in the series, we examine how to write a long program. This nearly always involves breaking things down into manageable chunks by the use of subroutines or procedures. So Mac is seen in Programme 3 in a supermarket, speculating about how a robot might be sent on a shopping spree, with orders to invoke PROC BEST-BUY, instructions on how to buy avocados and tomatoes with PROC PICK'N'WEIGH and elaborate details for PROC CHECKOUT.

Don't be alarmed at the thought of all that code – there'll be plenty of other things in the series. We'll be looking at the use of a home database, the fundamentals of which are introduced by Mac in the BBC's gramophone library with its one million records. (No, we don't suggest a micro could do that job!)

We'll look at word processing, artificial intelligence programs, at computer-aided design and so

forth. And – important to our overall aim – most of the software you see in the series (like the earlier series) will be available in some form or another for BBC micro-owners to get hold of, primarily through BBC Publications.

Applications of all kinds will be shown – on a range of micros. Here we're only interested in what's behind the applications – the hardware is of secondary importance. And when we stray from the strict field of the micro (for example when we look at computer-aided design of shoes at Clarks factory in Somerset), the aim will be to see how the humbler machines can do similar – if more limited – things. In this case, manipulating a three dimensional 'model' with a joystick, introducing hidden line removal and allowing the user to colour the object in – not with one of a million different possible colours (as with the shoes) but with about four.

Our examples must show the limitations of the technology as well as show its strengths – so here the relatively slow speed of the micro will be shown up (to give the lie to

all those clever, apparently instantaneous animation sequences you see on TV – they're really single, computer-generated pictures, shot one frame at a time on old technology (ie film). Finally, in that programme, we hope to show a professional two-dimensional CAD package (soon to be available on the BBC microcomputer), using the second processor and a precision joystick.

In other parts of the series there'll be demonstrations of the use of speech and music synthesisers, of how to get various sensors and control devices interfaced to the micro and how to use it as a communications device. For a rough breakdown of the subjects of each of the ten programmes, see *Acorn User's* July issue.

There's an old adage in broadcasting – 'never work with children or animals'. We have now expanded it to include micro-electronics! As I write, we have yet to record a single programme: watch this space for news of our progress – above all, watch the series. Fingers (if not wires) crossed, it starts in January, late Sunday evenings, BBC1.



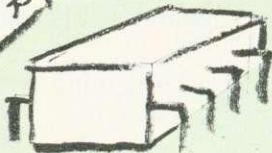
Assembly language, machine code, operating system – what do these pieces of jargon mean? Here, John Ferguson and Tony Shaw set you on the road to understanding what happens inside the BBC micro

Machine talk

10101001
00010100
10001101
00000000
00010111

LDA #14
STA 1700

ASSEMBLER



Following in the footsteps of the Acorn Atom, the BBC micro contains a machine code assembler 'embedded' in the Basic interpreter. The version on the Beeb is even friendlier, providing the ideal tool for both the novice and the expert to tackle assembly language programming.

The beginner might ask: 'Why bother with assembly language?' The classic reply is that the microprocessor's own language allows you to tackle problems where speed is important, where actions are required in microseconds rather than milliseconds, or where memory space is restricted.

Assembly language also allows you to 'lift the lid' and dip into the machine operating system, the machine code program that runs the Beeb.

The language used by the microprocessor bears little resemblance to Basic. The processor follows instead a numeric language of 0's and 1's called machine code. For example, the set of binary

numbers in the following program instructs the microprocessor to store the hex number 14 in memory location 1700 (hex).

Binary	Hex representation
1010 1001	A9
0001 0100	14
1000 1101	8D
0000 0000	00
0001 0111	17

A machine code program is similar to a Basic program in that both are a mixture of instructions and data. In the above example the code A9 tells the processor to load its accumulator (an internal register) with the next number, 14. The next code, 8D, instructs it to store the contents of the accumulator in the memory location defined by the next two numbers ie in 1700. The numbers representing the instructions are called operation codes or 'op codes'.

It is possible to write programs directly in machine code, but the process is slow and prone to error, requiring continuous reference to

tables of operation codes (*User Guide*, p508).

An alternative approach is to write programs in a more human and friendly format called 'assembly language' where alphabetic abbreviations, rather than binary or hex codes, are used to represent the instructions.

Abbreviations LDA and STA, for example, are used to represent the operations 'Load the ACcumulator' and 'STore the Accumulator'. These mnemonic abbreviations are much easier to remember than op codes.

Written in mnemonics the above example becomes:

LDA #14
STA 1700

But how does this assembly language program become a machine code program? The answer is to use a special translating program called an assembler, which translates the 'friendly' mnemonics into machine code (figure 1).

You do not have to be an experienced 6502 assembly language

Figure 1. A simple assembly language program

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65
170 STA 15750
180 RTS
190 ]
200 END

```

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65
170 STA 15750
180 RTS
190 ]
200 END

```

Figure 2. Essential parts of the program

Value given to P% determines where in memory the machine code will be placed by the assembler.

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
115 SLOC=15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65
170 STA SLOC
180 RTS
190 ]
200 END

```

Everything within [] is treated as an assembly language program

RTS forces a return to Basic at end of machine code program.

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65
170 STA 15750
180 RTS
190 ]
200 END

```

programmer to be able to use the BBC assembler. The following simple program can be entered, assembled and run by someone with no previous knowledge of assembly language.

Using the BBC computer, there are three essential features of any assembly language program (figure 2).

The most fundamental is the pair of square brackets - [] - (arrows in teletext mode). These tell the Basic interpreter that what appears between the brackets is to be treated as an assembly language program.

The value given to the parameter P% determines where in the memory the machine code program will be placed by the assembler.

The 6502 assembly language instruction RTS placed as the last item within the assembly language program ensures that program control will ReTurn to the Basic interpreter.

In the program shown in figure 2:

LDA #65 loads the accumulator with the value 65.

STA 15750 stores the contents of the accumulator (65) in location 15750.

When in mode 7, this will make

an 'A' appear on the screen, since location 15750 is part of the memory-mapped screen display and 65 is the ASCII value for 'A'. (Note that model B users should use location value 32134.) The phrase 'memory mapped' and the abbreviation 'ASCII' are briefly explained in figures 3 and 4.

Before attempting to assemble the program, ensure your computer is in mode 7. The following sequence of commands will then make our simple program perform

its intended task.

>RUN
>CALL &1500

Each of these commands performs a function essential to the successful operation of the program. In running the Basic program, the assembly language statements contained between the square brackets are translated into machine code. The translated program - essentially a series of 0's and 1's, is placed into an area of

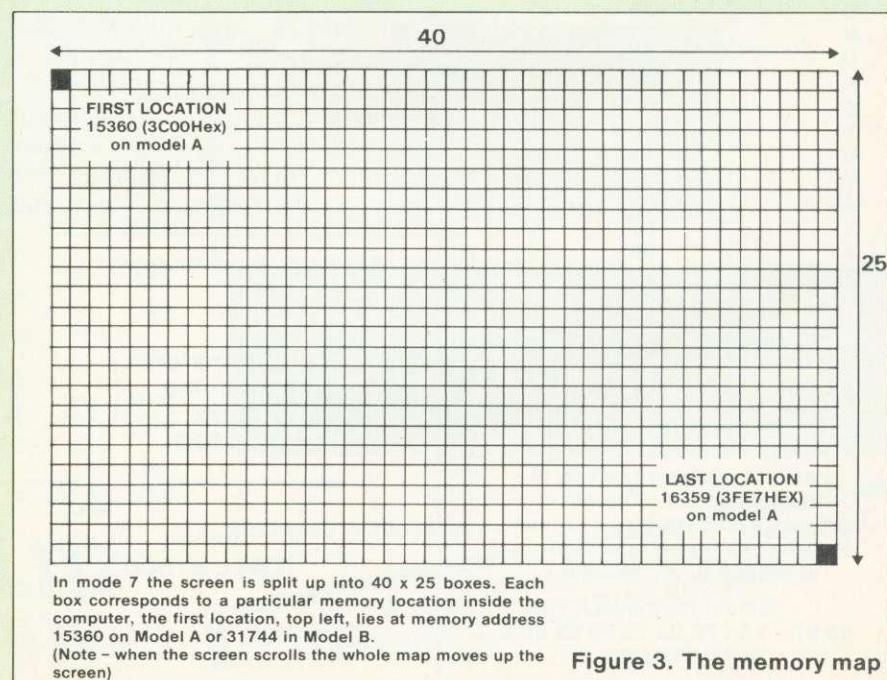


Figure 3. The memory map



CHARACTER	CODE	
	Decimal	Hex
SPACE	32	20
!	33	21
"	34	22
#	35	23
\$	36	24
%	37	25
&	38	26
¾	39	27
(40	28
)	41	29
*	42	2A
+	43	2B
,	44	2C
-	45	2D
.	46	2E
/	47	2F
0	48	30
1	49	31
2	50	32
3	51	33
4	52	34
5	53	35
6	54	36
7	55	37
8	56	38
9	57	39
:	58	3A
;	59	3B
<	60	3C
=	61	3D
>	62	3E
?	63	3F
@	64	40
A	65	41
B	66	42
C	67	43
D	68	44
E	69	45
F	70	46
G	71	47
H	72	48
I	73	49
J	74	4A
K	75	4B
L	76	4C
M	77	4D
N	78	4E
O	79	4F
P	80	50
Q	81	51
R	82	52
S	83	53
T	84	54
U	85	55
V	86	56
W	87	57
X	88	58
Y	89	59
Z	90	5A
½	91	5B
→	92	5C
↑	93	5D
█	94	5E
█	95	5F

Computers work only with numbers and use a coding system to represent letters of the alphabet etc. The most common system is the American Standard Code for information exchange or ASCII code.

Secret message

65 67 79 82 78 83 32 65 82 69
32 78 85 84 83

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65
170 STA 15750
180 RTS
190 ]

```

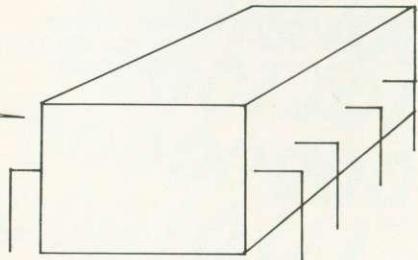


Figure 5. Effect of RUN on assembly language program

memory beginning at P% - &1500 in our example (figure 5). A listing will also be produced, which will be described later. It is possible to turn off the listing function.

Call is a Basic command that transfers program control to the program residing in memory at the location specified following Call. So this command is required to run our program, which was placed in the locations following &1500. The effect of CALL is illustrated in figure 6.

Once control has been transferred to the program, starting at location &1500, the computer's microprocessor will automatically attempt to execute the contents of succeeding memory locations. The important RTS is executed after the two instructions of our program (LDA and STA) have been carried out. This forces program control to return to the Basic interpreter - and normality is restored.

So the BBC assembler has been successfully used to create a machine code program from the assembly language statements included within our original Basic program. There are features that make the BBC especially powerful,

and some of these will be illustrated later. But to continue with the simple example, what do the contents of the listing tell us?

The listing displays the memory address and memory contents in hexadecimal, together with the corresponding mnemonics. RUN will automatically generate an assembler listing, unless an OPT statement (User Guide p314) has been used.

```

1500
1500 A9 41 LDA #65
1502 8D 0A 7D STA 15750
1505 60 RTS

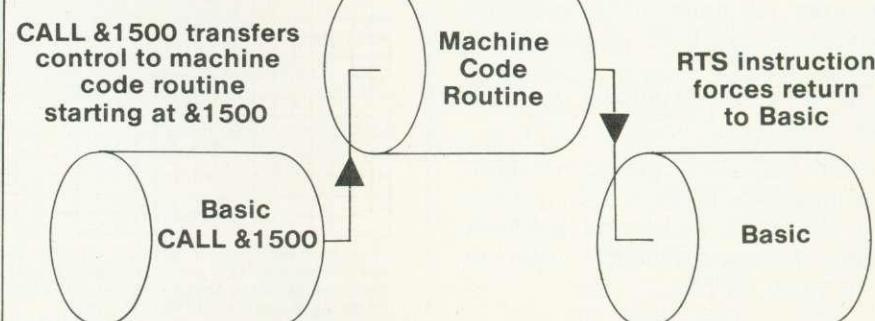
```

In the same way that the Rem statement can be used to include comments within a Basic program, comments can be incorporated in an assembly language program by preceding them with a backslash character (\). In the teletext mode, this is displayed as one half (½).

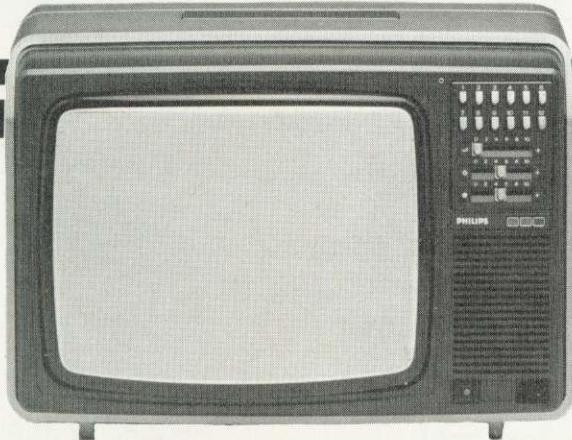
Comments are an important part of any program. However, given the lack of 'readability' of assembly

► page 78

Figure 6. Program flow



Cumana drives BBC Micro best!



**CUMANA DRIVES +
OWN POWER SUPPLY
= BIG PLUS FOR
BBC MICRO USERS
... JUST FOR
STARTERS**

**... PLUS NO HASSLE
12 MONTH WARRANTY**

The 'ice on the cake' is that, because the Cumana Drive has its own power supply, it can be used with many other Micros when connected via the appropriate cable. Cumana supply a Drive connecting cable which has a standard 34 way edge connector plus 34 way BBC connector in the same cable length. This allows the Cumana Drive to be connected to numerous makes of micro without the need to change connecting cable. And the Japanese manufactured disk drives are quiet and utterly dependable.

CS50A	Single sided 40 track TEAC drive in a cabinet with own power supply 100K	£199
CD50A	2 single sided 40 track TEAC drives in a cabinet with own power supply 200K	£369
CS50E	Single sided 80 Track TEAC Drive with cabinet and own power supply 200K	£265
CD50E	2 single sided 80 Track TEAC Drives in cabinet with own power supply 400K	£495
CS50F	Double sided 80 Track TEAC Drive with cabinet and own power supply 400K	£345
CD50F	2 double sided 80 Track TEAC Drives with cabinet and own power supply 800K 2 drive Cable for BBC Micro 2 drive Cable for BBC Micro plus TRS80, Video, Genie etc.	£619 £15 £18 £90

UPGRADE KITS

A → B

CUMANA LTD

Unit 1, The Pines Trading Estate, Broad Street,
GUILDFORD, Surrey, GU3 3BH. Tel: (0483) 503121.
Telex: 859380 CUMANA.

Please add VAT to all prices

**DEALER & EDUCATIONAL ENQUIRIES WELCOME -
GENEROUS DISCOUNTS AVAILABLE**



PROGRAMMER'S FORUM

The chance for readers to earn up to £20 by providing original hints and tips. Coping with BREAK is the subject of this month's column

THIS is the start of a new column in *Acorn User*. In the next three issues, Ian Birnbaum will be providing ideas on increasing the programmer's control and understanding of the BBC micro. This month he looks at the BREAK key. In the next two months, among other things, he will be showing you how to cope when you type OLD or O. instead of OLD or O.; how to save your program from within the program itself. But the real purpose of this column is for you, the readers, to send in your own tips.

These three columns should give you an idea of the sort of thing we want. What matters is that the hint is original, in that the gist of it should not have been published in any other magazine, and that it is described clearly and fully.

We will pay £5 for any hint published, with £10 for any which merits a one-star award, and, exceptionally, £20 for any which merits a two-star award.

Hints should be typed or computer written, and any substantial listings should be on cassette (programs should be included only if they illustrate a point). Mark the top of your contribution 'BBC Forum'. If you want your contribution returned, please enclose a stamped addressed envelope.

This column is also here to solve programming problems. If you have a problem you want answered, mark your letter 'Problems'. Ian cannot answer letters personally, but will endeavour to include a cross-section of the most interesting and commonly-occurring issues.

YOU can program the BREAK key *KEY 10, and this can be used to effectively 'disable' the Break key within a program.

*KEY10 OLD:MRUN:M or
*KEY10 OLD:MG.100:M

are the usual ways of doing this. In this sense, you are trapping BREAK in the same way you trap ESCAPE with ON ERROR.

But there is a difference. With ESCAPE you do not lose all the values of the variables within a program; with BREAK you do. This can be important in word processing, for example, where hours of editing and appending text can be wasted by the simple accident of pressing the BREAK key. However, there is a way to restore the values lost, and to build this into the programming of the BREAK key.

To understand how this is possible we must first understand how the BBC micro records the values it uses. First, the so called static variables, A% to Z%, are stored in fixed memory from &404 to &46B and are unaffected by the BREAK key (@% is also static, stored at &400 to &403, but this is affected by the BREAK key). Therefore if you use static variables for all your integer values BREAK will not harm them. This has the disadvantage of reducing readability in your program, but there is a second advantage of their being faster to access than variables with long names.

Location

All string, floating point and non-static variables are dynamic in that



Conducted by Ian Birnbaum

**This column will also answer
readers' queries. Hints or problems
should be addressed to Beeb Forum
Acorn User, 53 Bedford Square
London WC1B 3DZ**

```
10 A=5:B=9:C=4:D=9:T=7:@%=-4
20 PROCTEST
30 !&DFO=!2+24: !&DF2=!&482: !&DF6=!&48
6: !&DFA=!&4A8
40 *KEY10 0. :M@%=-4: ?2=?&DFO: ?3=?&DF1:
!&482=!&DF2: !&486=!&DF6: !&4A8=!&DFA:MG.
60 :M
50 A1=6:A2=1:A%=-GET
60 E=3:PROCTEST:PRINTA,A1,A2,B,C,D,E,
T:END
70 DEF PROCTEST:PRINT"OK":ENDPROC
```

their position in memory depends upon the program in which they are used and on the order they are accessed within that program. The location of the first variable of each initial letter is stored in a fixed place, however. The location of the first variable starting with A which has been met in a program is stored at &482, that with B at &484 and so on up to Z at &4F4.

When you type RUN, all these locations are set to zero (ie each contains &0000) : this is also true after you have pressed BREAK. It follows that if we can store the contents of these locations prior to BREAK being pressed, then we can restore them after BREAK has been pressed.

Since we do not know when BREAK will be pressed, this means we will have to initialise our variables early on in the program before we put the relevant details into memory. This has already been suggested for strings (see article on string handling last month page 24), so it means that in addition it has to be done for floating point

and non-static integers. This could be very laborious in some cases, but there is a way to make it easier. If, for example, all your floating point and integer variables begin with the letter A then you need only initialise one of them early on. The rest are fixed relative to this first one in that the place where the first is kept contains the address where the second is kept, and so on.

Speed factor

Of course, it is rather extreme to have all your variables starting with A; it also slows things down since the interpreter will have to skip through quite a few variables in memory to get to the A's at the end of the list. But if you always arrange to initialise first those variables where speed is a factor, and to use only a few of the available letters to start your variables, then it is not too laborious to initialise the key variables prior to saving locations in memory.

One more fact is required before we see how to program the BREAK key. The interpreter has to keep track of where the first free location in memory is at any time: the information is kept in locations two and three. This information will change as more variables are created. For this reason, we must reserve space for all the variables uninitialised prior to the saving of two and three. As a rule of thumb, allow 10 plus the name length for each integer or floating point variable. Also dimension all arrays prior to saving two and three. We are ready to look at an example now. Run the program given.

When OK comes up, press BREAK – the values of all the variables will be displayed. Moreover, the PROC will still work: the reason for this will be discussed in next month's column.

Contamination

It should be clear how this program works. Line 30 saves the relevant values (using the 'pling' operator – see chapter 39 of the *User Guide* for details) in &DFO to &DFB: these are otherwise unused in a standard system. Line 40 programs the BREAK key to put these saved values back into their original places. We cannot generally use !2 here for it would contaminate locations four and five which is the stack pointer (in fact it would be safe in this particular example).

Experiment with this, and try to incorporate the idea into your own programs where pressing the BREAK key could otherwise be disasterous.

Run **BBC** type **BASIC** on your **ATOM**

then switch back to **ATOM BASIC**

Available now from Acornsoft, a 20k BBC ROM conversion module which can be added inside an Atom. It will support the full set of BBC - type BASIC commands. The BASIC syntax is identical so all programs that don't rely on the BBC hardware can be run on the Atom without any modification.

The module is fitted in parallel with Atom BASIC and may be selected by a switch or from the keyboard if certain modifications are made. It consists of 16k BASIC ROM, 4k operating system ROM and an additional 2k RAM that can be used by the Atom as well.

Complete with manual

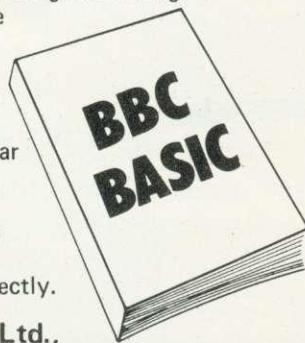
A comprehensive BBC - type BASIC manual is supplied with every set giving full operating and fitting instructions, alternatively the module can be fitted by your dealer.

The price is £49.95 including VAT.

If you don't have a dealer near you just write to us with a cheque at the address below, or credit card holders can ring Cambridge (0223) 316039 and order directly.

Dept AU3, Acornsoft Ltd.,
4a Market Hill, CAMBRIDGE CB2 3NJ

ACORN**SOFT**



TV/RGBS - TV/MONITORS

A range of television receivers supplied with a 6 pin DIN socket to accept the RGBS output of the BBC/Acorn.

This gives clear, crisp characters and graphics from your computer

and off air TV at the flick of a switch.

14" — £250.00

16" — £275.00

20" — £309.00

22" — £334.00

and a giant 26" for group viewing — **only £414.00**

Newark Video Centre
108 London Rd, Balderton, Newark, Notts.
Tel: 0636 71475

All prices + VAT and carriage

BBC

ELTEC SERVICES LTD



COMPUTERS

BBC Model "A" (in stock now)
BBC Model "B" (in stock now)
BBC Model "A" plus extra 16K memory

16K Hitachi memory (as fitted by ACORN)

£299.00
£399.00
£330.00

£31.00

FULL UPGRADE KIT (Genuine ACORN issue)

£90.00

UPGRADE KIT fitting charge

£10.00

CASSETTE RECORDERS

Cassette Recorder (Pye)
Cassette Recorder (Ferguson)
Cassette Recorder (Sony)
Cassette lead (7 pin DIN/3 jacks)
Blank Cassettes (Scotch 3M)

£23.00
£28.00
£37.95
£5.00
£0.70

PRINTERS

Seikosha GP100A
EPSON MX80 F/T III
EPSON MX100 F/T III
SMITH CORONA Daisy Wheel Printer
Printer Cable

£225.00
£390.00
£530.00
£557.00
£18.40

MONITORS

14" Full colour MONITOR
(used in BBC computer programmes)
12" Green Screen MONITOR
RGB Monitor Lead
Monitor lead

£309.35
£126.00
£5.00
£5.00

BBC SOFTWARE

ACORN SOFTWARE Peeko Computer	£9.95
ACORN SOFTWARE Defender	£9.95
ACORN SOFTWARE Monsters	£9.95
ACORN SOFTWARE Philosophers Quest	£9.95
ACORN SOFTWARE Snapper	£9.95
ACORN SOFTWARE Arcade Action	£11.90
ACORN SOFTWARE Desk Diary	£9.95
Sinclair Mutant Invaders	£3.95
Sinclair Super Hangman (Hilarious! with sound)	£3.95
Sinclair "B" Invaders (Just like the Pub version)	£6.95
Sinclair Beebmunch (Like Snapper)	£5.95
Sinclair 3-D Maze (FAST & INTRICATE!)	£3.95
Sinclair WORD PROCESSOR	£9.95
PRO-DIS Disassemble/Dump/Edit	£9.14

PS for ATOM OWNERS!

DISATOM SUPER ROM 27 new words plus FULL DISASSEMBLE	£29.95
SOFTSWITCH 4X4K ROMS Software selectable, plug-in PRO LOG ADC Board. Eight inputs for joysticks, paddles machine inputs	£24.95
ACORN SOFTWARE BBC BASIC board	£49.50

PRICES ARE VAT INCLUSIVE
P&P £1.00 for orders under £100.00
Orders over £100.00 add £10.00
for a Securicor Delivery

ELTEC SERVICES

231 Manningham Lane, Bradford BD8 7HH
Telephone: (0274) 491372
Opening hours Mon-Fri 8.30 am-5 pm
Sat 9-12 (noon)

In a far-flung galaxy on an uncharted edge of Earth's decaying Empire, a lone Starship fights a losing battle as it stalks its prey - the Klingons.

But the enemy ships are lying dormant, waiting for the Earthship to come within range.



Then, they pounce. And the battle-weary humans can only take so much. Their precious energy dwindles with every move and each encounter saps the Starship's strength.

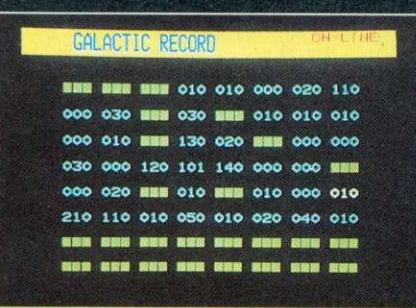
But the Klingons can

be beaten. Supplies are available from Starbases - though they are few and far between, and their positions unknown. So it will take careful planning and every last ounce of the Starship Commander's cunning to win.

**TIM HEATON
presents**

TREK III

A STARSHIP'S LAST STAND



Your job as Starship Commander is to destroy all 15 Klingons (red arrows), using as little time and energy as possible. Your initial energy level dictates the level of difficulty.

First you have to find the enemy. Your Starship (yellow arrow) is moved using the BBC micro's four cursor keys. The normal screen, or short range scan, gives one sector of an eight by eight area of space. Your sector position is given under 'AREA' (see short range scan, SRS, above left).

Two computers are under your control - nav-com and arm-con. To enter the first, press N on the keyboard, and hold it down for a couple of seconds. The screen will change to give information on energy and sector and four command choices:

- *Return to SRS*; this gives you back the normal screen.
- *See Cumulative Galaxy Record*; essentially says where you have been (above right). The three digits give first the number of Klingons, the number of stars (red

* in SRS), and the number of Starbases in each sector you have explored.

- *Starbase data*; provides co-ordinates of bases found and energy left. Each contains up to 20,000 units of fuel. To dock at a Starbase (blue @) just position the Starship on top. Energy may be left for later.
- *Enter armaments computer*. This can be achieved also by pressing A when in short range scan.

The arm-com gives details on energy, photon torpedos fired (you have seven), shield level and number of Klingons destroyed. Its three commands are:

- *Return to SRS*
- *Fire photon torpedos*; these never miss when a Klingon is in range.
- *Reset shield*; input energy up to 2000 units
- *Enter nav-com*.

The shields give protection from Klingons, who automatically attack when you enter their sector. If you have no shields, your

computers are put out of action for 30 seconds. Enemy hits are inversely proportional to shield strength, but each weakens the shields and costs energy. So the sooner you destroy the attacking Klingon, the better.

As well as the photon torpedos, you have phasers. But these must be aimed and fired in one of four directions by the keys 1(up), 2(right), 3(down), 4(left), when using the normal short range scan display.

When you meet a Klingon, or start running low on energy the screen will flash and give a STATUS RED report. If you try to leave the eight by eight grid, you find you can't and lose all shield energy.

Each torpedo and phaser uses 1000 units of energy. Each move uses ENERGY/1000 units, resetting shields uses SHIELD/40 units. Energy is the deciding factor, so use it wisely.

To play, LOAD "TREK III", wait for the cursor prompt > and then RUN.

Good luck, and happy hunting.



```

10 MODE7:*FX4,1
20 YC$=CHR$131:RC$=CHR$129:GC$=CHR$1
30
30 PRINTTAB(6,1)CHR$141;GC$;CHR$136"
T=R=E=K III":PRINTTAB(6,2)CHR$1
41;GC$;CHR$136" T=R=E=K III"
40 PRINTTAB(5,12)YC$"40 IS EASIER":P
RINTTAB(2,10)YC$"INPUT DIFFICULTY (5-40
) ";:INPUTD
50 VDU23,0,11,0,0,0:PRINTTAB(0,24)
60 ENVELOPE 1,3,2,2,2,50,30,30,126,-
1,-1,-1,90,80:ENVELOPE 2,1,100,100,100,
100,100,100,126,-50,-50,120,90
70 DIM quadrant%(8,8),klingon%(15,2)
,base%(5,2),recharge%(5)
80 OK$=YC$+"ALL SYSTEMS OK      ":"Dn
av$=RC$+"NAV-COM DAMAGED      ":"Darm$=RC
$+"ARM-COM DAMAGED      ":"NK$=YC$+"NO KL
INGONS IN RANGE"
90 HK$=YC$+"KLINGON DESTROYED      ":"LS
$=RC$+"SHIELD LOW      ":"LE$=RC$+"E
NERGY LOW      ":"RS=RC$+CHR$136+"RE
D"
100 GS=GC$+"GREEN"
110 star$=CHR$133+"*":phaser$=GC$+CHR
$255:base$=CHR$134+"@":klingon$=RC$+"^"
:enterprise$=YC$+"~":"blank$=GC$+CHR$255
+CHR$255+CHR$255
120 status$=G$:report$=OK$:Dnav=0:Dar
m=0:Dkli=0
130 energy=D*10000:k1=15:NQ=0:B=0:mov
e=0:shield=1000:phaser=0:photon=7:hit=0
:torpedoe=0
140 navT=9999999:armT=9999999:k1T=999
999
150 PROCinst:TIME=0
160 PROCsrs:PROCscren
170 PROCsrsfill:PROCmove:PROCenergy:P
ROCcommand:PROCklingon:PROCcheck
180 GOT0170
190 DEFPROCinst
200 FORX=1 TO 8:FORY=1 TO 8
210 quadrant%(X,Y)=110
220 NEXTY:NEXTX
230 QposX=RND(8):QposY=RND(8)
240 SposX=RND(22)+3:SposY=RND(10)+4
250 FORL=1 TO 100
260 R1=RND(8):R2=RND(8)
270 quadrant%(R1,R2)=quadrant%(R1,R2)
+10
280 IF L>15 GOTO 340
290 RX=RND(8):RY=RND(8)
300 quadrant%(RX,RY)=quadrant%(RX,RY)
+100
310 klingon%(L,1)=RND(22)+3:klingon%(L,2)=RND(9)+4
320 IF L>5 GOTO 340
330 base%(L,1)=RND(8):base%(L,2)=RND(8)
340 NEXTL:ENDPROC
350 DEFPROCsrs
360 CLS:SOUND3,-15,200,1
370 PRINTTAB(1,3)CHR$150;CHR$55;TAB(1
,15)CHR$150;CHR$117;TAB(28,3)CHR$107;TA
B(28,15)CHR$122
380 FORZ=3 TO 27:PRINTTAB(Z,3)CHR$96;
TAB(Z,15)CHR$112;:NEXTZ
390 FORZ=4 TO 14:PRINTTAB(1,Z)CHR$150
;CHR$53;TAB(27,Z)CHR$150;CHR$106:NEXTZ:
PRINTCHR$159
400 PRINTTAB(30,2)CHR$132;CHR$157;YC$
;"TIME ";CHR$156
410 PRINTTAB(29,5)CHR$131;CHR$157;RC$;
;"ENERGY ";CHR$156
420 PRINTTAB(29,8)CHR$133;CHR$157;YC$;
;"STATUS ";CHR$156
430 PRINTTAB(30,11)CHR$134;CHR$157;CH
R$132;"AREA ";CHR$156
440 PRINTTAB(29,14)CHR$130;CHR$157;YC$;
;"SHIELD ";CHR$156
450 PRINTTAB(1,17)CHR$129;CHR$157;YC$;
;"STATUS REPORT: ";CHR$156
460 ENDPROC
470 DEFPROCnavcom
480 IF Dnav=1 LET report$=Dnav$:GOTO1
70
490 CLS:SOUND3,-15,100,2
500 H$="NAVIGATION COMPUTER":PROChead
ings
510 PRINTTAB(0,6)CHR$129;CHR$157;YC$;
" ENERGY:"
520 PRINTTAB(0,7)CHR$134;CHR$157;CHR$132;" QUADRANT:";QposX;";";QposY
530 PRINTTAB(2,14)YC$;"<1> _ Return t
o S.R.S."
540 PRINTTAB(2,15)YC$;"<2> _ See cumu
lative galaxy record"
550 PRINTTAB(2,16)YC$;"<3> _ Star_bas
e data"
560 PRINTTAB(2,17)YC$;"<4> _ Enter arm
aments computer"
570 A$=INKEY$(10):A=VAL(A$)

```

A

ATOM & BBC

A



"ZODIAC"

Following the success of our 1st Adventure Competition (winner to be published next month). We are launching our second Adventure Competition (we have doubled the prize money as well). "Zodiac" is your greatest challenge yet from A&F. Solve the problem of this Astrological Adventure and you could win £100. Full machine code program requires 12K RAM.

Price £6.90

Closing date 30/11/82 the winner will have £100 in his hand in time for Christmas.

ATOM * UTILIKIT EPROM

FOR JUST £18.50 YOU CAN ADD 22 BASIC COMMANDS AND FIVE FEATURES!! TO YOUR ATOM

(SUPPLIED FULLY DOCUMENTED ON 4K EPROM)

COMMANDS Read; Restore; Data; Tone; Key X; Clr; Disassemble; On Error; On Escape; Var; Hex; At; List (controlled list with up & down scroll facility); Renumber; Find; Search & Replace; Auto; Delete; Block Move; Cold; Warm; Fast; Slow.

***1200 BAUD CASSETTE OPERATING SYSTEM FEATURES** Visible Load/Save; Audio indication of successful Load/Save; Extended Lines (up to 208 characters per line); Auto Repeat on all keys (except Break & Lock); Auto list of line when an error occurs.

THE BEST VALUE FOR MONEY TOOLKIT AVAILABLE! WHAT! ALREADY GOT A TOOLKIT FITTED? Why not buy our Add-an-Eeprom Board — add up to 4 Eproms for only £18.00

The Best Software
The Best Prices

BBC

ROADRUNNER MOD. B

The opposition will stop at nothing to get you. In this arcade style car chase: dodge through the Sunday traffic, weave to avoid their fire as the black cars try to shoot you off the road! Beware the hells angels who assist them!

Can you survive?

£6.90

EARLY WARNING MOD. B

Destroy the attacking waves of ICBMs using a radar tracking system and intercept missiles. 48 Levels — Each one harder than the last.

£6.90

NEW "TOWER OF ALOS" MOD. A & B

A fully interactive adventure program for the BBC. Clear "ALOS" of its monster and demons. Fight your way to fame and fortune.

£6.90

SPECIAL OFFER
DEDUCT £1 PER ADDITIONAL CASSETTE ORDERED.

BBC MOD B ONLY

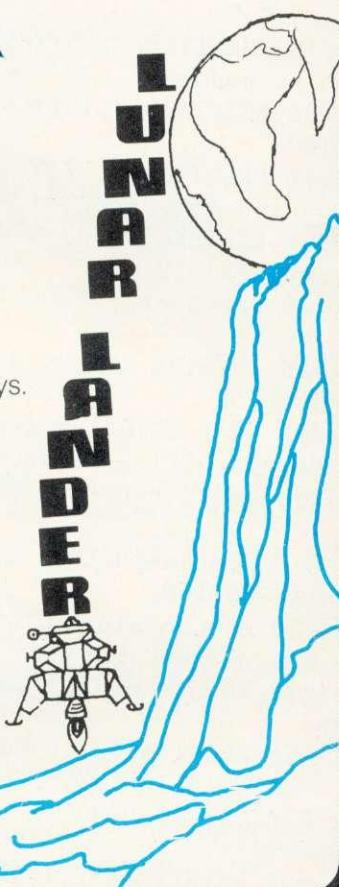
A superb reproduction of the popular arcade game. Four skill levels, realistic sound and high-res graphics. Long range and close up Luna Landscape Displays. A safe soft landing is your target.

But can you do it?

PRICE ONLY £6.90

Why not buy our Add-on Eprom Board. Add up to 4-Eeproms for only

£21.00 or up to 6-Eeproms for only £28.00



Orders to A&F Software, 830, Hyde Road, Gorton, Manchester M18 7SD.
Orders by mail or phone (061) 223 6206 24 hour
All prices fully inclusive no hidden extras
Micro-Link * A&F's Showroom now open
Address as above.
We pay 25% royalties on ATOM/ BBC programs

VAT REGISTRATION NO. 380 44 7057



A



```

580 *FX15,0
590 PROCenergy:PROCklingon:PRINTTAB(1
5,6);energy
600 IF A<>1 AND A<>2 AND A<>3 AND A<>
4 GOTO570
610 ON A GOTO 160,2160,2400,640
620 ENDPROC
630 DEFPROCarmcom
640 IF Darm=1 LET report$=Darm$:GOTO1
70
650 CLS:SOUND 3,-15,150,2
660 H$="ARMAMENTS COMPUTER":PROCheadi
ngs
670 PRINTTAB(0,6)CHR$129;CHR$157;YC$;
" ENERGY:"
680 PRINTTAB(0,7)GC$;CHR$157;YC$;" PH
OTON TORPEDOES:"
690 PRINTTAB(0,8)CHR$134;CHR$157;CHR$132;" SHIELD:"
700 PRINTTAB(0,9)CHR$133;CHR$157;YC$;
" KLINGONS:"
710 PRINTTAB(2,14)YC$;"<1> _ Return t
o S.R.S."
720 PRINTTAB(2,15)YC$;"<2> _ Fire ph
oton torpedoes"
730 PRINTTAB(2,16)YC$;"<3> _ Reset sh
ield"
740 PRINTTAB(2,17)YC$;"<4> _ Enter na
vigation computer"
750 B$=INKEY$(10):B=VAL(B$)
760 *FX15,0
770 PROCenergy:PROCklingon:PROCarfil
1
780 IF B<>1 AND B<>2 AND B<>3 AND B<>
4 GOTO750
790 ON B GOTO 160,800,820,480
800 IF LEFT$(STR$(quadrant%(QposX,Qpo
sY)),1)="1" report$=NK$:kLT=TIME:GOTO16
0
810 photon=photon-1:torpedoe=1000:PRO
Chit:GOTO160
820 PROCsshield:GOTO160:ENDPROC
830 DEFPROCsrssfill
840 PRINTTAB(32,3)CHR$129;INT(TIME/10
0)
850 PRINTTAB(31,6)CHR$131;energy;" "
860 PRINTTAB(30,9)CHR$133;status$;
870 PRINTTAB(32,12)CHR$134;QposX;" ,";
QposY
880 PRINTTAB(32,15)CHR$130;shield;" "
890 PRINTTAB(3,18)report$;
900 ENDPROC
910 DEFPROCenergy
920 energy=INT(energy-(shield/40)-pha
ser-torpedoehit-move):move=0:phaser=0:
hit=0:torpedo=0
930 ENDPROC
940 DEFPROCcommand
950 C$=INKEY$(0)
960 *FX15,0
970 IF C$="" GOTO1030
980 SOUND3,-4,220,1
990 IF C$="1" OR C$="2" OR C$="3" OR
C$="4":SOUND3,-15,100,5:PROCphasers
1000 IF C$="N" PROCnavcom
1010 IF C$="A" PROCarcom
1020 IF C$="S" PROCsshield
1030 ENDPROC
1040 DEFPROCscreen
1050 IF MID$(STR$(quadrant%(QposX,Qpos
Y)),2,1)="1" GOTO1090
1060 FOR L=1 TO (VAL(MID$(STR$(quadran
t%(QposX,QposY)),2,1))-1
1070 PRINTTAB(RND(22)+3,RND(10)+4)star
$
1080 NEXTL
1090 IF LEFT$(STR$(quadrant%(QposX,Qpo
sY)),1)="1" GOTO 1130
1100 FOR L=1 TO VAL(LEFT$(STR$(quadran
t%(QposX,QposY)),1))-1
1110 PRINTTAB(klingon%(k1,1),klingon%
(k1,2))klingon$
1120 NEXTL
1130 ENDPROC
1140 DEFPROCmove
1150 NQ=0:PRINTTAB(SposX,SposY)" "
1160 M=INKEY(0):IF M=-1 GOTO1310
1170 *FX15,0
1180 move=energy/1000
1190 IF M=136 SposX=SposX-1:enterprise
$="[""
1200 IF M=137 SposX=SposX+1:enterprise
$="]"
1210 IF M=138 SposY=SposY+1
1220 IF M=139 SposY=SposY-1:enterprise
$="^"
1230 IF SposX<3 QposX=QposX-1:SposX=25
:NQ=1
1240 IF SposX>25 QposX=QposX+1:SposX=3
:NQ=1

```



1250 IF SposY<4 QposY=QposY+1:SposY=14
:NQ=1
1260 IF SposY>14 QposY=QposY-1:SposY=4
:NQ=1
1270 IF QposX<1 QposX=QposX+1:SposX=3:
shield=Ø
1280 IF QposX>8 QposX=QposX-1:SposX=25
:shield=Ø
1290 IF QposY<1 QposY=QposY+1:SposY=14
:shield=Ø
1300 IF QposY>8 QposY=QposY-1:SposY=4:
shield=Ø
1310 PRINTTAB(SposX,SposY)enterprise\$
1320 IF NQ=1 GOTO160
1330 ENDPROC
1340 DEFPROCklingon
1350 K=VAL(LEFT\$(STR\$(quadrant%(QposX,
QposY)),1))-1:IF K=Ø GOTO 1440
1360 SOUND1,1,1Ø,1Ø:SOUND2,1,3Ø,1Ø:sta
tus\$=R\$
1370 FOR Z=1 TO K
1380 hit=RND(23ØØ-shield):shield=INT(s
hield-(hit/23))
1390 IF RND(shield+5)=3 Dnav=1:navT=TI
ME
1400 IF RND(shield+5)=4 Darm=1:armT=TI
ME
1410 IF shield<Ø Dnav=1:navT=TIME:Darm
=1:armT=TIME
1420 PRINTTAB(6,21)"":PRINTTAB(
2,21)YC\$;"HIT:";hit
1430 NEXTZ
1440 ENDPROC
1450 DEFPROCphasers
1460 P=VAL(C\$)
1470 IF P=1 X1=Ø:Y1=-1
1480 IF P=2 X1=1:Y1=Ø
1490 IF P=3 X1=Ø:Y1=1
1500 IF P=4 X1=-1:Y1=Ø
1510 phaser=1ØØØ:M2=Ø
1520 IF SposX+(M2*X1)=klingon%(k1,1) A
ND SposY+(M2*Y1)=klingon%(k1,2) PROChit
:GOTO1580
1530 PRINTTAB((SposX+((M2-1)*X1)),Spos
Y+((M2-1)*Y1));";TAB((SposX+(M2*X1))
,(SposY+(M2*Y1))):phaser\$
1540 IF SposX+(M2*X1)>24 OR SposX+(M2*
X1)<4 OR SposY+(M2*Y1)>13 OR SposY+(M2*
Y1)<5 PRINTTAB(SposX+(M2*X1),SposY+(M2*
Y1))":GOTO1590
1550 M2=M2+1:SOUND3,1,2ØØ,1
1560 PROCenergy:PROCsrsfill:PROCklingo
n
1570 GOTO1520
1580 PRINTTAB(SposX+((M2-1)*X1),SposY+
((M2-1)*Y1))" "
1590 ENDPROC
1600 DEFPROCshield
1610 SOUND3,-15,18Ø,1:MS=Ø:shield=Ø
1620 PRINTTAB(2,23)GC\$;"SHIELD:"
1630 D\$=INKEY\$(Ø):S=VAL(D\$)
1640 PROCenergy:PROCklingon
1650 IF B=3 PROCarmfill ELSE PROCsrsfi
11
1660 IF D\$="S" OR D\$=""GOTO1630
1670 IF S<Ø OR S>9 GOTO1630
1680 MS=MS+1:PRINTTAB(12,23)S
1690 IF MS=1 S=S*1ØØØ
1700 IF MS=2 S=S*1ØØ
1710 IF MS=3 S=S*1Ø
1720 shield=shield+S
1730 IF MS=4 GOTO1750
1740 GOTO 1630
1750 IF shield>2ØØØ shield=2ØØØ
1760 PRINTTAB(32,15)":TAB(2,23)
)" "
1770 ENDPROC
1780 DEFPROChit
1790 SOUND2,2,1ØØ,1Ø:SOUNDØ,-15,4,8:Dk
li=1:report\$=HK\$:k1T=TIME:status\$=G\$
18ØØ quadrant%(QposX,QposY)=quadrant%(
QposX,QposY)-1ØØ
1810 PRINTTAB(klingon%(k1,1),klingon%(
k1,2))" "
1820 k1=k1-1:PRINTTAB(2,21)" "
1830 ENDPROC
1840 DEF PROCarmfill
1850 PRINTTAB(17,6)energy;TAB(25,7);ph
oton;TAB(17,8)shield;TAB(17,9)k1
1860 ENDPROC
1870 DEF PROCbase
1880 PRINTTAB(15,1Ø)base\$
1890 PROCenergy:PROCsrsfill:PROCmove
1900 IF SposX<>15 OR SposY<>1Ø GOTO196
Ø
1910 report\$=YC\$+"DOCKED": "+STR\$(
recharge%(L1))
1920 IF recharge%(L1)=2ØØØØ report\$=RC
\$+"DOCKED: NO FUEL":GOTO1880

```

1930 energy=energy+100:recharge%(L1)=r
recharge%(L1)+100
1940 SOUND1,-10,(20000-recharge%(L1))/100,3:SOUND2,-10,(20000-recharge%(L1))/101,3
1950 GOTO1880
1960 ENDPROC
1970 DEFPROCcheck
1980 IF k1=0 PROCwin
1990 IF energy<0 PROCclose
2000 FORL1=1 TO 5
2010 IF QposX=base%(L1,1) AND QposY=base%(L1,2) PROCbase
2020 NEXTL1
2030 IF RIGHTS(STR$(quadrant%(QposX,QposY)),1)="0" quadrant%(QposX,QposY)=quadrant%(QposX,QposY)+1
2040 report$=OK$:status$=G$
2050 IF VAL(LEFT$(STR$(quadrant%(QposX,QposY)),1))>1 status$=R$
2060 IF shield<10 shield=0:report$=LSS
2070 IF Dkli=1 report$=HK$
2080 IF Dnav=1 report$=Dnav$
2090 IF Darm=1 report$=Darm$
2100 IF TIME>navT+3000 Dnav=0:navT=999
999:report$=OK$
2110 IF TIME>armT+3000 Darm=0:armT=999
999:report$=OK$
2120 IF TIME>kLT+1000 Dkli=0:kLT=99999
9:report$=OK$
2130 IF energy<20000 report$=LE$:SOUND3,1,energy/100,5:status$=R$
2140 ENDPROC
2150 DEFPROCgalrec
2160 CLS
2170 H$="GALACTIC RECORD":PROcheadings
2180 FOR X=1 TO 8:FOR Y=1 TO 8
2190 SOUND1,-12,(X*30)+Y*2,1
2200 IF QposX=X AND QposY=Y col=135 ELSE col=134
2210 R=VAL(RIGHT$(STR$(quadrant%(X,Y)),1)):M=VAL(MID$(STR$(quadrant%(X,Y)),2,1)):L=VAL(LEFT$(STR$(quadrant%(X,Y)),1))-1
2220 Nbase=0
2230 IF R=0 PRINTTAB(X*4,(11-Y)*2)blan
k$:GOTO2260
2240 FOR L1=1 TO 5:IF X=base%(L1,1) AND Y=base%(L1,2) Nbase=Nbase+1:NEXT L1
2250 PRINTTAB((X*4),(11-Y)*2)CHR$col;L
;M;Nbase
2260 NEXT Y:NEXTX
2270 A=GET:GOTO160
2280 ENDPROC
2290 DEF PROCclose
2300 CLS:PRINTTAB(2,3)""! YOU FOOL
!!""YOU RAN OUT OF FUEL IN ";TIME/100;" secs"
2310 GOTO2370
2320 DEF PROCwin
2330 CLS:PRINTTAB(2,3)""! WELL DONE CAPTAIN !!"YOU EXTERMINATED ALL THE KLINGONS"
2340 score=INT((energy/(TIME/100))*(41-D)):IF score>H% H%=score
2350 PRINTTAB(1,8)"STARBASE COMMAND AWARDS YOU ";score"" POINTS"
2360 PRINTTAB(5,12)"HI-SCORE=";H%
2370 PRINTTAB(2,20)"PRESS 'R' TO ERADICATE ANOTHER SECTOR"
2380 IF INKEY$(0)="R" RUN ELSE GOTO2380
2390 DEF PROCbasedets
2400 CLS
2410 H$="STAR-BASE DATA":PROcheadings
2420 PRINTTAB(0,5)GC$+"STARBASE POSITION ENERGY AVAILABLE"
2430 FOR Z=1 TO 5:SOUND3,-10,Z*50,1:PRINTTAB(1,(Z*2)+6)CHR$131;Z
2440 IF RIGHTS(STR$(quadrant%(base%(Z,1),base%(Z,2))),1)="0" PRINTTAB(14,(Z*2)+6);_____:GOTO2460
2450 PRINTTAB(14,(Z*2)+6);base%(Z,1);",";base%(Z,2)
2460 PRINTTAB(30,(Z*2)+6);20000-recharge%(Z)
2470 NEXTZ:A=GET:GOTO160
2480 DEFPROCheadings
2490 PRINTTAB(0,2)CHR$131;CHR$157;CHR$132;CHR$141;TAB(6,2)H$
2500 PRINTTAB(0,3)CHR$131;CHR$157;CHR$132;CHR$141;TAB(6,3)H$
2510 PRINTTAB(26,2)CHR$131;CHR$157;CHR$129;CHR$136;CHR$140"ON-LINE";TAB(0,3)CHR$131
2520 ENDPROC

```

BBC SOFTWARE

for the discerning user from the specialists

(Model A or B)

Free Computerised decision
making program with any
order for two or more
programs

Cassette Based:

Data Base	£19.95
Invoices & Statements	£19.95
Mailist	£19.95
Wordpro	£19.95
Commercial Accounting (Including VAT)	£19.95
Inventory Control	£19.95
Home Accounts	£19.95

Coming November:

Complete modular range of disc-based
Business Software

£49.95
per module

SEND SAE FOR CATALOGUE

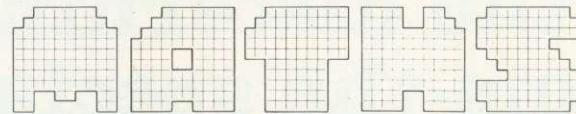
GEMINI MARKETING LTD

9 SALTERTON ROAD, EXMOUTH, DEVON EX8 2BR.

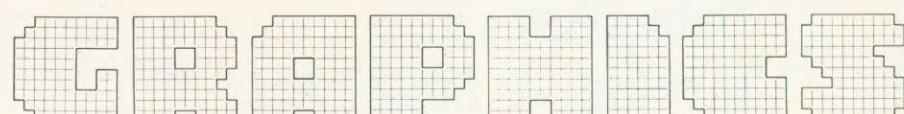
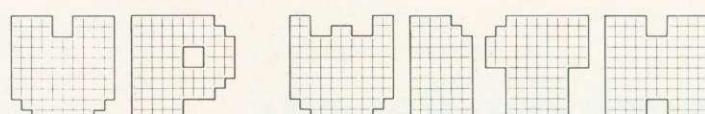
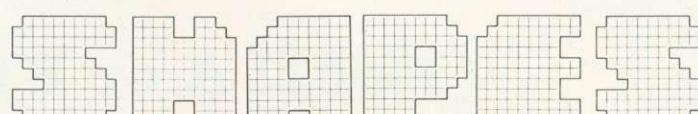
TEL: (03952) 5832



Access Telephone Orders Welcome



Computer Graphics can put some fun into maths lessons for children in middle schools.
Robin Norman explains how his class used a BBC machine



Open evening was looming and word went out that a contribution on 'shapes in maths' was required from each class. Then, at a staff meeting, came the great idea - let's get the children to design pictures made of triangles and program the smart BBC computer to draw them on the screen.

The decision taken, the design stage went without a hitch. We all laid out grids on squared paper, and drew X and Y scales going from 0 to 1250 and 0 to 900 respectively, in steps of 50. The Y axis was kept a little short to make room for names and titles. Programming would be easier, I suggested, if the corners of triangles were all on grid intersections; and we agreed that clever pictures would have some of their triangles joined edge to edge. And then we were off - stars, boats, birds, space shuttles and Snoopies... next time I will set a limit of five or seven triangles and make it a challenge!

While felt pens in their dozens were brightening up the pictures, I was considering how to bring the computer in. A BBC model A in mode 5 will paint pretty triangles in red, yellow or white, but the coding to do this is complicated for 12-year olds.

L.

```

1 REM TRIPIC2. (C) 1982 R.J.NORMAN
100 MODE5
110 VDU23;8202;0;0;0:PRINT
200 REPEAT
210 PROC DATA
220 UNTIL FALSE
10000 DEFPROC TRIPIC:LOCAL A$, X%, Y%, C%, S%
10010 READ name$: IF name$ = "END" ENDPROC
10020 READ title$: PRINT TAB(0, 1); name$; : S
% = 20 - LEN title$: IF S% < LEN name$ + 2 PRINT;
10030 PRINT TAB(S%); title$
10040 READ A$
10050 IF A$ = "NEXT" PROC PAUSE: CLS: GOTO 10010
10060 IF A$ = "M" READ X%, Y%: MOVE X%, Y%: GOTO 10040
10070 IF A$ = "P" READ X%, Y%: C% = C% + 1
10080 IF C% > 3 THEN C% = 1
10090 GCOL 0, C%: PLOT 85, X%, Y%: GOTO 10040
10200 DEFPROC DATA
10210 RESTORE 10230
10220 PROC TRIPIC
10230 DATA ANTHEA, FREDDY FISH, M, 250, 400,
M, 450, 300, P, 450, 550, P, 950, 400, M, 1050, 30
0, P, 1100, 550, NEXT
10240 DATA SNOOPY, YACHT, M, 400, 100, M, 125, 250,
P, 1100, 100, P, 1150, 250, M, 600, 250
, M, 300, 300, P, 600, 800, M, 600, 900, P, 750, 85
0, M, 600, 800, M, 600, 250, P, 1150, 300, NEXT
10300 DATA END
10310 ENDPROC
10400 DEFPROC PAUSE
10410 *FX15, 0
10420 P% = INKEY(500)
10430 ENDPROC

```

I did want the class to feel they had done something towards the programming, so we hit on a compromise. Each child had to convert his picture to a data line containing his name, the picture title and a combination of the following commands

MOVE eg M,100,250

This means move to the screen position (100,250), and fix the apex of a triangle there.

PAINT eg P,500,100

This means move to the screen position (500,100), fix the apex of a triangle there, and paint the triangle formed by the last 3 positions given – whether these three were MOVE or PAINT did not matter.

NEXT means pause for five seconds to see the finished picture then clear the screen for the next one.

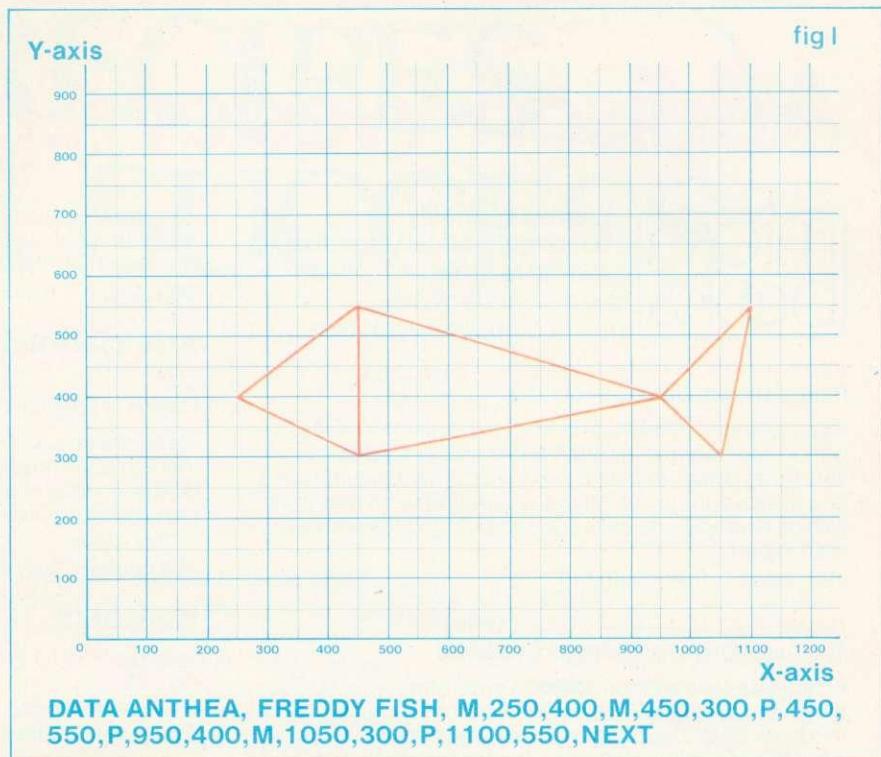
Figure 1 shows one of the simpler pictures with its DATA line. Each child worked out his or her own data, with help when needed, and we had half a dozen volunteers who typed them in to save time. It's very important to leave no trailing spaces after string DATA items – it is easy to do, especially after the final NEXT, and it spoils the pictures. Leading spaces are ignored, and so are those after numbers.

A backing program was obviously needed to convert the DATA lines into the instructions to make the BBC do what we wanted and it is shown here. You might like to add a title frame but don't use up too much of your precious RAM, which is in short supply in mode 5 on a model A.

Integer variables have been used throughout to save RAM – the program has room for about a dozen pictures, but you can save it on tape as often as you like with different sets of pictures. If you get bored with the colours, you can change them at will (or at random) by using the VDU 19 statement.

It was an enjoyable exercise and we got a lot from it by using the simple triangle – to make patterns and pictures.

We also had a lot of practice in working out X and Y co-ordinates. The computer made it very obvious – by drawing silly pictures – where



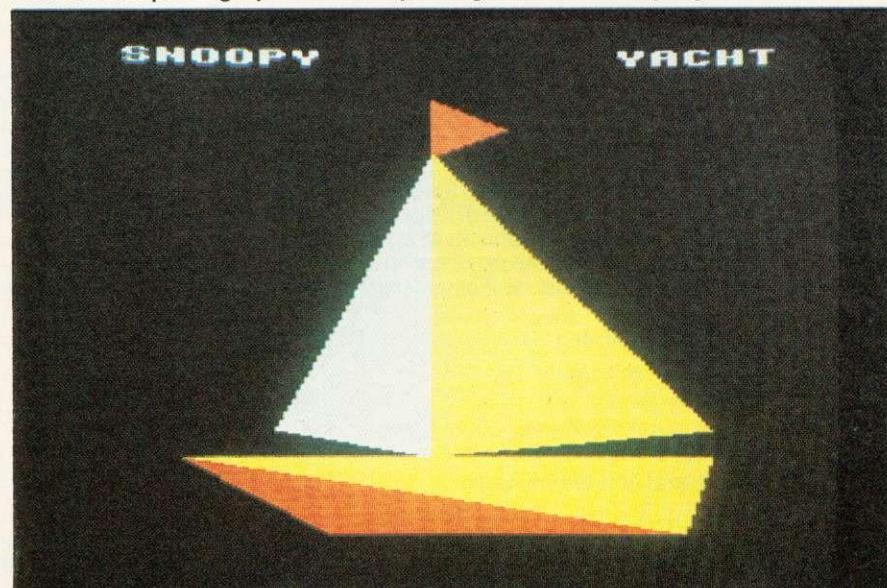
we had got them wrong.

And seeing how a computer can use a series of pairs of co-ordinates to draw a picture on the screen (the basis of all TV pictures) was extremely satisfying. Typing and editing the DATA lines was good practice and I had a ready-made PROC for drawing 'real pictures' (as opposed to random or mathematical patterns). I shall extend it to include a DRAW instruction for drawing lines and a bit more colour control.

It's not often that a maths teacher can honestly claim his pupils are enjoying their lessons, but our 'triangle project' for Open evening ensured fun and education for kids and staff alike – even if only for its duration.

And when the parents saw the masses of pretty pictures adorning the classroom wall they realised that we were actually doing something educational and different with the computer we had bought with their hard-earned cash!

This screen photograph was set up using data from the program above



Addison-Wesley Computing



A series of quality, reasonably-priced paperbacks created to meet the demands of the microcomputer revolution

PASCAL FROM BASIC

Peter J Brown, University of Kent

If you're fluent in BASIC and want to go on to PASCAL without starting from scratch again, this is the book for you. Peter Brown explains the development, advantages, and disadvantages of Pascal, illustrating each new idea with an example. He calls it 'a computing book you can read in bed'.

192 pages fully illustrated

£5.95 paper

BASIC AND THE PERSONAL COMPUTER

Thomas A Dwyer and Margot Critchfield

An easy-to-follow introduction to programming in BASIC and extended BASIC for personal computer applications, this book illustrates the great diversity of applications possible on a microcomputer. It is an ideal self-instruction manual for the new user.

438 pages fully illustrated

£9.95 paper

REAL TIME PROGRAMMING - Neglected Topics

Caxton C Foster

A practical, applied book for experienced programmers, REAL TIME PROGRAMMING provides an original approach to acquiring the skills needed to connect microcomputers to other computer systems and to access their programs.

224 pages fully illustrated

£6.95 paper

THE LITTLE BOOK OF BASIC STYLE: How to Write a Program You Can Read

John M Nevison

Anyone with two hours' programming experience in BASIC can use this book to improve their programming style. It gives nineteen simple rules of style which, once mastered, will reduce the time and practice needed to write better programs.

160 pages fully illustrated

£4.95 paper

Computers in Education

A PRACTICAL GUIDE TO COMPUTERS IN EDUCATION

Peter Coburn, Peter Kelman, Nancy Roberts, Thomas Snyder, Daniel Watt, and Cheryl Weiner

This concise American book will help teachers in Britain take full advantage of the educational opportunities offered by microcomputers. Spanning all ages, abilities, and subject areas, it is filled with practical tips, recommendations, resources, and actual classroom applications.

192 pages fully illustrated

£6.00 paper

Graphics

FUNDAMENTALS OF INTERACTIVE COMPUTER GRAPHICS

James D Foley and Andries van Dam

This comprehensive volume is indispensable for anyone seriously involved with computer graphics. With over 500 illustrations, many in full colour, it covers every aspect of

creative graphics - hardware, software, data structure, mathematical manipulation, user interface, and fundamental implementation algorithms.

960 pages fully illustrated

£15.95 hard

Artificial Intelligence

LISP

Patrick H Winston and Berthold K P Horn

This lucid account demonstrates how symbol manipulation is used in practice. Case studies from many different areas of artificial intelligence illustrate the basic concepts and provide the information needed to go on to further study.

430 pages fully illustrated

£7.95 paper

Networks

THE CAMBRIDGE DISTRIBUTED COMPUTING SYSTEM

R M Needham and A J Herbert, Cambridge University Computer Laboratory

For those who already have some knowledge of logic and computing system design, this book provides a complete description of one complete network system - the Cambridge Ring. The authors discuss the main design issues, functions and applications.

286 pages fully illustrated

£8.50 paper



Addison-Wesley Computing

Addison-Wesley Publishers Ltd
53, Bedford Square, London WC1B 3DZ

ORDER FORM

Please send me the following books. I enclose my cheque for £ _____

OR

Please debit my Access/Barclaycard/Visa/Diners Club/American Express Account No.

— Brown/Pascal from BASIC	0 201 13789 5	£5.95
— Coburn/Practical Guide to Computers in Education	0 201 10563 2	£6.00
— Dwyer/BASIC and the Personal Computer	0 201 01589 7	£9.95
— Foley/Fundamentals of Interactive Computer Graphics	0 201 14468 9	£15.95
— Foster/Real Time Programming	0 201 01937 X	£6.95
— Needham/The Cambridge Distributed Computing System	0 201 14092 X	£8.95
— Nevison/The Little Book of BASIC Style	0 201 05247 4	£4.95
— Winston/LISP	0 201 08329 9	£7.95

Name _____

Address _____

Signature _____ Date _____



Addison-Wesley Computing
53, Bedford Square, London WC1B 3DZ

RECIPES FOR SUCCESS

A computer without software is no good in a classroom.

But who can write the programs?

Jane Whitwell solved the problem by sitting two mothers in front of a machine with a set of recipes, or procedures to use as building blocks

Our first Acorn Atom arrived on six-month loan last January, but of the eleven members of staff and more than 300 excited children, only I had any previous experience of computers. Yet the major problem was yet to come. The new machine had no accompanying software!

By July we had trained two mothers of children in the school to be part-time programmers and written more than 20 programs

by line 'explanation' and enough information, in the form of tables and charts to make alterations.

Our experience with children between the ages of six and twelve has shown that screen presentation is a major consideration in any program - particularly when dealing with the younger child whose reading ability may be restricted and whose memory span may be small.

We have been able to draw up a list of recommendations when using text on a TV screen:

- keep the text on the screen to a minimum.
- use short, concise messages, questions and answers.
- use plenty of spaces and delete old or superfluous text.
- do not write text too close to the screen edges as distortion effects can make it hard to read - especially when several children are gathered round a 14-inch screen.

Having had to return our first machine we are now looking forward excitedly to our very own BBC microcomputer and are eager to use the text/graphics window facility of this machine.

I have produced, therefore, a recipe which will produce a text window and a graphics window on a BBC model A micro. The window positions and dimensions were chosen to be suitable for even the youngest child when using a 14-inch screen:

```

10 MODE 5
20 VDU 24,5;5;500;500;
30 VDU 28,10,20,19,5
40 COLOUR 129
50 COLOUR 3
60 GCOL 0,130
70 CLS:CLG

```

The program can be explained as follows:

Line 10: The model A provides two graphics modes - 5 or 4. If this line is changed to mode 4 the effect is interesting but useless in this context.

Line 20 sets up the graphics window in the bottom left of the screen. Refer to figure 1 for a full account of the dimensions.

Line 30 sets up the text window in the top right of the screen.

'Presentation on the screen is a major consideration'

suitable for our full primary age range, covering both language and mathematics.

We also had a computer club running every lunchtime and could boast proudly that almost every child in the school had used the machine - including the top two classes of our partner infant school.

This success was achieved by using a system we called 'recipe programming'. Here I produce short sections of code (usually in the form of subroutines) which perform a specific task - read in a child's name, draw a square, set up a two-dimensional array holding the days of the week, accompanied by a line

'Keep text to a minimum and avoid edge distortion'

Refer to figure 1 for a full account of dimensions.

Line 40 sets up the background colour in the text window - in this case red. Refer to figure 2 to change colour.

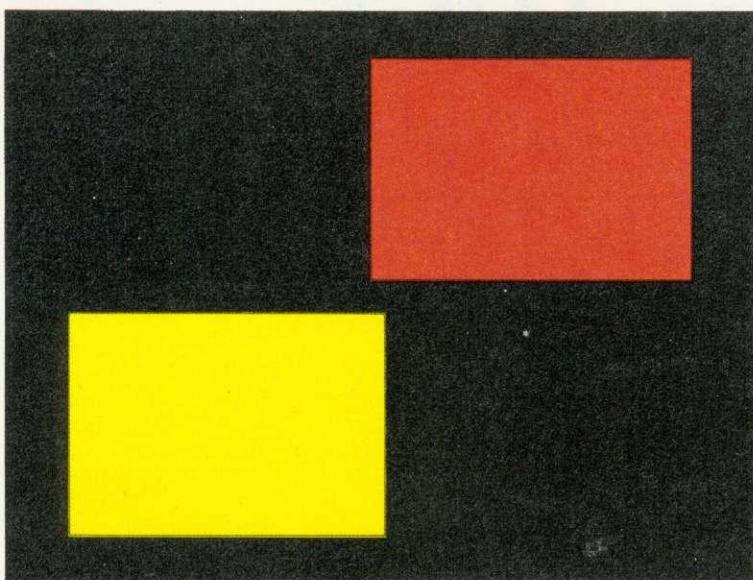
Line 50 sets up the foreground colour in the text window (the colour of the writing) in this case white. Refer to figure 2 to change colour.

Line 60 sets the background colour in the graphics window - in this case yellow. Refer to figure 2 to change colour.

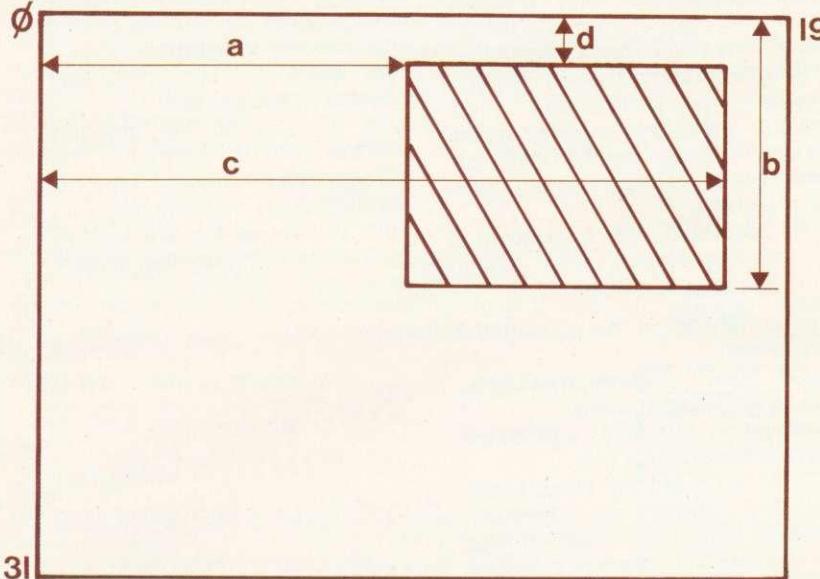
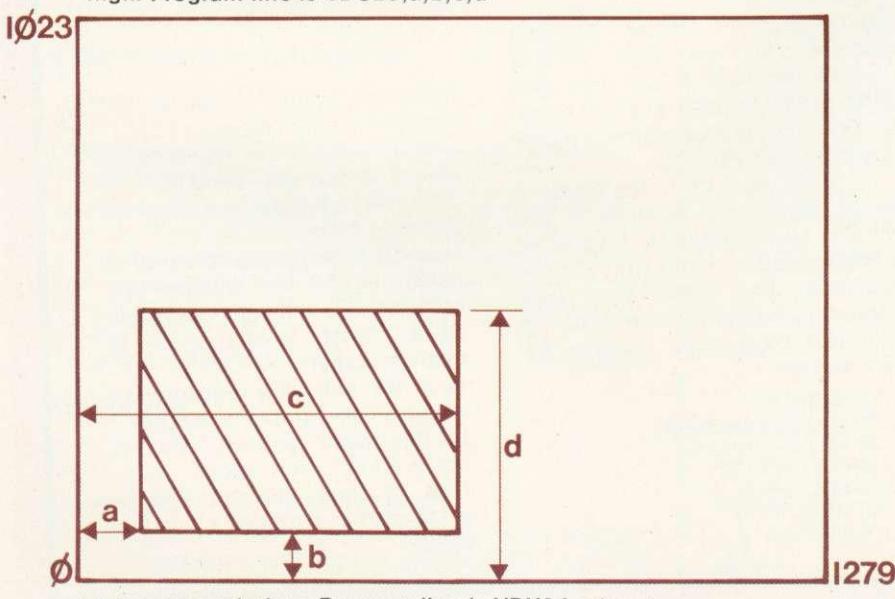
Line 70 clears the text window (CLS) and the graphics window (CLG).



Figure 1. Relative size of windows in mode 5



(a) Representation of windows on screen

(b) Text window is $(c - a + 1)$ characters wide by $(b - d + 1)$ characters high. Program line is VDU28,a,b,c,d

(c) Graphics window. Program line is VDU24,a;b;c;d;

If typed in and run this recipe gives a red block and a yellow block on a black screen.

And if a one-colour printing loop is added to the window recipe:

```
80 FOR N=1 TO 100
90 PRINT "HELLO"
100 NEXT
```

the size and colour combinations can be seen in the text window. The white colour of the text (the foreground colour) was set by line 50 of the window recipe. To put up text in one colour and then another colour try:

```
80 FOR N=1 TO 100
90 PRINT "HELLO"
100 NEXT
110 COLOUR 2
120 FOR N=1 TO 100
130 PRINT "GOODBYE"
140 NEXT
```

and use figure 2 for changes to line 110.

Taking the window recipe (line

'It is important that early experiences are successful'

10 – line 70) a recipe can be added to draw a square within the graphics window:

```
180 MOVE 100,100
185 GCOL 0,0
190 DRAW 400,100
200 DRAW 400,400
210 DRAW 100,400
220 DRAW 100,100
```

Line 185 sets the colour of the lines of the square ie the 'graphics window foreground' colour – in this case black. Refer to figure 2 to change colour.

A useful recipe in this context is for the isosceles triangle which colours equal lines red and the base line black:

```
280 MOVE 100,100
285 GCOL 0,1
290 DRAW 200,400
300 DRAW 400,100
310 GCOL 0,0
320 DRAW 100,100
```

Figure 2 shows how to change line 285 and line 310 for other colour combinations.



Text window		Graphics window		
	F'ground	B'ground	F'ground	B'ground
Black	COLOUR 0	COLOUR 128	GCOL 0,0	GCOL 0,128
Red	COLOUR 1	COLOUR 129	GCOL 0,1	GCOL 0,129
Yellow	COLOUR 2	COLOUR 130	GCOL 0,2	GCOL 0,130
White	COLOUR 3	COLOUR 131	GCOL 0,3	GCOL 0,131

Figure 2. Recipe codes for various colour combinations

Foreground (scores: 1 = poor contrast, 5 = good contrast)				
	Black	Red	Yellow	White
Background	Black	invisible	3	5
	Red	3 to 4	invisible	2 to 3
	Yellow	4	2	invisible
	White	4	2 to 3	1

Figure 3. Success of colour combinations

The square recipe can be used and then followed by the isosceles triangle with a CLG line inserted between the two. If this is omitted, the square is drawn first and the triangle is then inscribed.

Certain colour combinations give better results than others. If the window recipe (line 10 – line 70) is combined with the one-colour print loop (line 80 – line 100) and then the square recipe added (line 180 to line 220) a complete program can now be run to show all the effects. We have been able to draw up a combination table based on our results (figure 3).

Figure 4 gives the line numbers to be changed to produce different colour combinations and figure 2 gives the code.

We are sure the text/graphics window of the model A will have many uses in the programs we produce for the classroom. I am working on other recipes which, in conjunction with those outlined above, will form the basis of a

series concerning geometric shape discrimination.

I am also devising, in association with an infant teacher, an exercise in simple co-ordinate plotting designed for a top infant class. And want to produce a series of programs concerned with the teaching of time – a complicated task which lends itself well to implementation on the BBC micro.

We find this method of producing software is quick and efficient – and this is vital for a busy

teacher with little programming knowledge. It also makes my job easier when called on to debug another person's program.

Now, with the ever-increasing introduction of computers into schools, it is important the early experiences be successful. The teacher must add software designer and programmer to an already crowded job description. And any system which can make this easier can only increase computer use in the classroom.

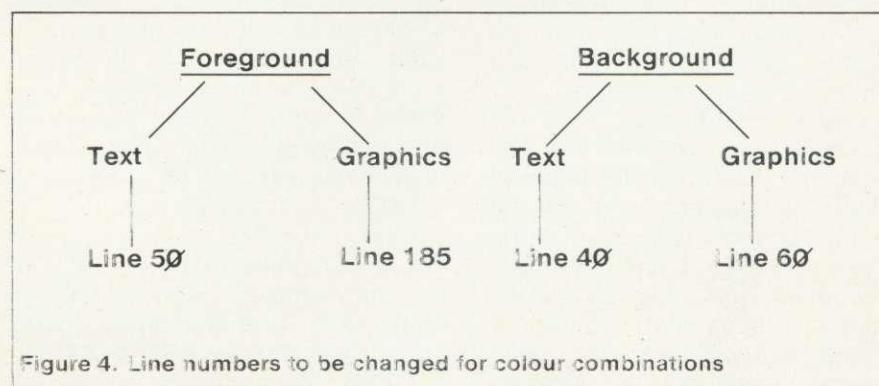


Figure 4. Line numbers to be changed for colour combinations

10 TEN PROGRAMS IN ONE MICRO

This isn't possible, you might think, but Michael Murray knows it can be done, and here he tells you how

The biggest handicap in mounting an effective micro-computer demonstration is the time taken to load programs from tape. For many, the simple solution - disc drives - is financially out of the question, so the only answer seems to be to have several programs in the machine at the same time.

The most obvious way to do this is to enter them as routines in one long program with a selection procedure, but this is both tedious and totally inflexible once the selection of programs to be combined has been decided. The other method involves entering a selection of different programs in separate sections of memory and jumping from one to another at will. The following procedures will enable this method to be carried out.

The basic principle is simple. After a program has been entered the page boundary is set above the top of it and the next program is then entered, and this may be repeated *ad infinitum* within the limits of the available memory.

However, in practice it is not quite so simple, so it is vital the procedures described are followed carefully or later programs will not function correctly. If an error is made it is likely that one or more of the programs will not function at all, or may run but be unable to list.

Once the programs have been correctly loaded it will appear to

the user that the only program in the machine is the one being used, and in fact each program may be treated as if this is the case. Each program may be run, listed, or edited without affecting the others, as long as its length is not increased past the next page boundary, in which case it would corrupt the following program.

If NEW is used the machine will only forget the current program, and it may be restored by OLD as usual. The same applies to the BREAK, OLD procedure. However, if BREAK, OLD is used, the computer will return to the first program.

If any program is deleted or corrupted the others will not be affected and movement from one program to another can be achieved with a single function key.

Whether entering programs by keyboard or tape, it will be necessary between each program to determine TOP and set the new value of PAGE. So if many programs are to be entered it is easier to use a function key rather than entering similar instructions many times. This can be done by:

```
*KEY0"PAGE=TOP+&100:IM
PRINT PAGE :IM
```

The actual value of PAGE set will be the nearest page boundary above TOP. Page boundaries occur each Hex 100 ie &EOO, &FOO, &1000, &1100 and so on.

Before loading or entering the first program check that PAGE is at the default value of &EOO by entering:

```
PRINT~PAGE
```

If the answer is not EOO enter:

```
PAGE=&EOO
```

Load the first program in the usual way if you want to use tape. If the function key has been programmed correctly, press it and load the next program and repeat until all programs have been loaded. Each time the function key is pressed the new value of PAGE will be printed on the screen.

If the function key is not being used after each program has been loaded enter:

```
PRINT~TOP
```

Then determine and enter the new value of PAGE. For example, if TOP = 1E72 then the required new value will be PAGE = &1FOO. Whichever method is used, it is essential to keep a record of all the page boundaries.

To load from the keyboard, enter the first program in the usual way. Before loading a second program you must change the value of PAGE and then type NEW for the next program to be accepted.

This is most easily done by programming a function key as follows:

```
*KEY0"PAGE=TOP+&100:IM
PRINT PAGE :IM NEW :IM
```

Demonstration programs

```
*KEY0"PAGE=TOP+&100'M
PRINT"PAGE :M NEW 'M"
```

Program 1
 10 PRINT"PROGRAM 1, PAGE=";PAGE
 20 PRINT"LOMEM=";LOMEM

Program 2
 Press f0 (note new PAGE=&F00)
 10 PRINT"PROGRAM 2, PAGE=";PAGE
 20 PRINT"LOMEM=";LOMEM

Program 3
 Press f0 (note new PAGE=&100)
 10 PRINT"PROGRAM 3, PAGE=";PAGE
 20 PRINT"LOMEM=";LOMEM
 OLD

After each program has been entered it is then only necessary to press f0 (or whichever key was programmed) before entering the next. Keep a note of all PAGE values printed when the function key is pressed.

Because the computer normally sets LOMEM = TOP, if a program produces any variables (which are stored starting at LOMEM) it is possible for them to run over the next page boundary and corrupt the next program. This can be avoided by setting LOMEM = TOP of the last program entered (type OLD).

To go from one program to another all that is needed is to set the value of PAGE to the start of the program required, which is why it was necessary to keep a note of the PAGE boundaries. LOMEM was set when OLD was typed after the last program was entered and will stay there as long as the computer's pointers are not reset in any way. If the pointers are reset, LOMEM will be set to the top of which ever program is being accessed after the reset. This may be overcome by returning to the last program and resetting the pointers with the OLD command. As a safeguard this may be done before each program is run.

It is recommended that function keys are used for going from one

program to another, one for each program loaded, as follows:

```
*KEYnumber"PAGE=Hex Address of
last program !M OLD !M
PAGE=Hex address of program
wanted !M RUN !M"
```

To show these procedures work, try the demonstration programs given.

To run the programs, use the function keys thus:

```
*KEY1"PAGE=&1000 !M OLD !M
PAGE=&E00 !M RUN !M"
*KEY2"PAGE=&1000 !M OLD !M
PAGE=&F00 !M RUN !M"
*KEY3"PAGE=&1000 !M OLD !M
RUN !M"
```

The underlined commands are not necessary in all circumstances, but are included in case the computer's pointers are ever reset by ESCAPE, OLD or NEW. In this case they are not necessary because they reset LOMEM above the last program and these programs create no variables, but they are included as an example.

Programs 1, 2 and 3 may now be run simply by pressing f1, f2 or f3. (It will be seen that LOMEM always stays above program 3 even if ESCAPE or BREAK, OLD are used - try it.) If the programs were such that they did not end, but ran continuously, then it would be necessary to press ESCAPE before the function key. Any number of

programs may be entered as described as long as there is sufficient memory available. In practice it has been found that when running small demonstration programs the limiting factor is often not memory but the number of function keys.

Another, neater, method than the one above will work if there is space at the beginning of each program to insert an extra line, and none of the programs use the resident integer variable chosen (see below). It is basically the same as that already described except:

- After each program is entered, add an extra line at the beginning:
 1 LOMEM=L% (or any other resident integer variable).
- After the last program has been entered and OLD has been typed, type:
 L%=LOMEM

When the function keys are programmed they will now require less programming than before:

```
*KEYnumber"PAGE=Hex address of
program wanted !M RUN !M"
```

This is because each program itself will now set LOMEM above the last program, and the value they use, being held as resident integer variable, is protected from the effects of the commands that reset the computer's pointers.

OAKLEAF COMPUTERS LTD

Education Hobbyist &
Small Business Computers



IT'S NOT JUST
ACORNS THAT
LOOK BETTER
ON AN **OAKTREE**
WORKSTATION

THE UNIT SUITS BBC VIC 20
TRS 80 ZX SPECTRUM ETC.

With a built-in accessory drawer,

this smart unit turns your setup into a professional and business like system. The drawer holds up to 50 diskettes or your tape collection and leads etc.

TWIN USER JOYSTICK INTERFACE ATOM/BBC £13.95

Protect the keyboard of your computer by interfacing "Atari" joysticks to it. The joysticks plug into the interface which in turn simply plugs into either the Atom 64 way bus or the BBC 20 way user port. (Atom bus units available at £3.99 if ordered with the interface). Now two people can successfully play games or one person can have more control over the computer. Full software supplied.

ATOM LATEST

If Atom have made it, we stock it. Disk drives off the shelf. Hardware, books, printers. Phone now. Prices always competitive.

BBC MODEL B NOW IN STOCK

Full or partial upgrades, memories, printers of disk interfaces etc. All available. Prices dropping. Phone for quotation. All current BBC peripherals stocked.

ALL PRICES INCL. VAT AND P&P
Please send your remittance to:

121 DUDLEY ROAD GRANTHAM,
LINCS. NG31 9AD
TELEPHONE: (0476) 76994



ACORN SPECIALISTS

ACORN

SPECIALISTS

TELEPHONE: (0476) 76994

GOLEM LTD Computer Services

77 QUALITAS, BRACKNELL, BERKSHIRE RG12 4QG

TELEPHONE: BRACKNELL (0344) 50720

BBC SOFTWARE

EDUCATIONAL - 1 (A/B)

£8.05

Hours of fun and learning for children between 5 and 9. Animated graphics will make children enjoy math, spelling, clock, memory games, etc.

EDUCATIONAL - 2 (A/B)

£8.05

Hours of fun and learning for children between 7 and 12. Animated graphics will make children enjoy math, spelling, memory games, etc.

SUPERLIFE (B)

£9.20

Fast (machine code) version in a large universe.

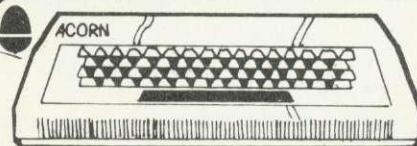
Add 50p P/P per order.

Please state whether Model A or B and quote reference AU11.

Cheque/P.O. to:

GOLEM Ltd

77 Qualitas,
Bracknell,
Berks, RG12 4QG
Tel 0344/50720



ACORN ATOM 8K + 2K.....	£129
ACORN ATOM 12K + 12K.....	£179
ATOM COLOUR BOARD.....	£39
FLOATING POINT ROM.....	£22
BBC ROM PACK.....	£ Phone
POWER SUPPLY 1.8A.....	£10

IT'S HERE AT LAST!



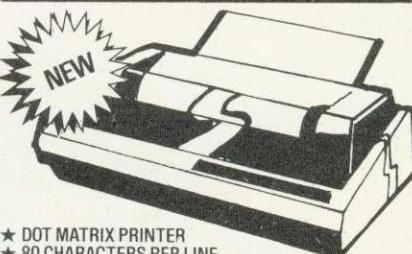
Upgrade your ATOM with the new low cost disc pack only

£299 plus VAT

Includes utility disc.

ATOM modification extra.

SEIKOSHA GP-100A



- ★ DOT MATRIX PRINTER
- ★ 80 CHARACTERS PER LINE
- ★ 30 CHARS/SEC
- ★ FREE HI-RESOLUTION 'DUMP OUT' LISTING

ACORN Printer Cable £16 + VAT
ATOM Modification EXTRA

BBC MICRO

SPACE WARP... £11.50 BBC MULTIFILE... £25.00
BBC CHESS... £11.50 BBC BACKGAMMON... £ 8.00

BBC GOLF..... £ 7.00 MUNCHYMAN... £ 5.95

Send for details on other items, cables, cassettes, plugs, software etc.

BBC MICRO

MICRO UPGRADES

RAM KITS: Upgrades the Model 'A' to 32K RAM Supplied with full fitting instructions. £29.90 + VAT

ANALOGUE KITS: Suitable for adding joysticks, controllers etc. £15.00 + VAT

POWER INTERFACE & I/O PORT: Enables a Centronic Interface printer to be attached. £16.00 + VAT

MODEL 'A' TO MODEL 'B' UPGRADE

£86.00 + VAT

DISC EXPANSION..... Phone

DISC DRIVES..... Phone

COLOUR MONITORS..... £249.00 + VAT

Send for details on other items, cables, cassettes, plugs, software etc.

Why not send your machine to us for upgrading?

PRINTERS

EPSON MX80 F/T2 — The printer recommended for the BBC Microcomputer.

- ★ Dot Matrix Printer
- ★ 80 Cps

- ★ Hi-Resolution Graphics
- ★ Bi-directional Printing



Telephone STD (0438) 65385
2 Daltry Close, Old Town, Stevenage.

BBC
Service & Information Centre.

Q-Tek Systems

Joe Telford sets up figures and landscapes for the BBC micro with the help of FOR NEXT loops to make your programs go . . .

FASTER AND FASTER

There are hardly any programs which have no use for a NEXT LOOP. Their value is that they allow a number of commands to be executed for a set number of times. When graphics in Basic seem slow because many parts of the screen are moving in different directions, FOR NEXT loops allow the programmer to speed up his programs.

Program 1 takes 1.28s to run (version 1.0 EPROMs) – which is slow for the BBC micro. Imagine taking this time to move a bullet up the screen! Although the colon lines and the REM line help to make the program understandable, they are executed 1000 times. Both a colon and a REM do nothing, but the computer has to interpret these lines.

To maintain readability the REMs should be placed outside the loop. Re-writing lines 30, 40, 50, will speed up the loop to take 0.64 seconds – twice as fast. This speed gain can be further increased, although the next step does reduce readability.

When the computer executes a

```
10 Z=TIME
20 FOR X=1 TO 1000
30:
40 REM THIS LOOPS AROUND 1000 TIMES
50:
60 NEXT X
70 PRINT TIME-Z;" /100 SEC"
```

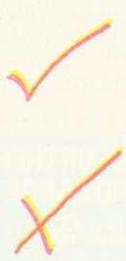
Program 1. Points out crossed loops

FOR NEXT loop, it translates the NEXT line and looks for the variable at the end of the line – X, in Program 1. The program then checks that this variable matches the one in the corresponding FOR line. If it does match, the loop continues; if not, an error message is generated. This is because while nested loops are allowed:

```
10 FOR X = 1 To 10
20 FOR Y = 1 TO 5
120 NEXT Y
130 NEXT X
```

crossed loops are not:

```
10 FOR X = 1 TO 10
20 FOR Y = 1 TO 5
30 NEXT X
40 NEXT Y
```



But, if we lose the variable from the NEXT lines, the computer automatically assumes that each NEXT line belongs to the last incompletely FOR line. This clears the way for a further speed increase because no check needs to be made.

Altering line 60 to read 60 NEXT reduces the execution time to 0.5s. The final stage is to alter the control variable in line 20 to 20 FOR X% = 1 TO 1000. X% is an integer variable, and integers – whole numbers – are stored in a representation which allows addition to be performed speedily. Integer loops, though, cannot handle

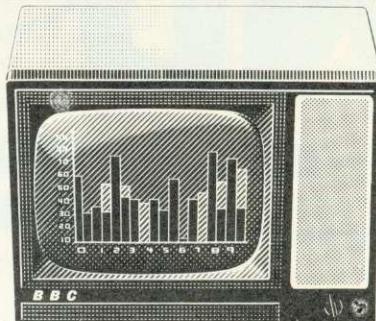
MICRODAGE

ELECTRONICS

BBC Microcomputers 'B's and expanded 'A' IN STOCK NOW!

BBC Model 'B' wordprocessing pack at a low price of only £699. Save £44. Normal price £743.

Normal price £743.
The Pack consists of: BBC Model 'B' GP100 Printer Cables, Cassette Player Word Processing ROM 1,000 sheets of paper. Then add the GP100A Printer at only £215. The lowest price ever.



BBC MACHINES

Model A, 32K RAM + 6522

Chip	£329.00
Model B	£399.00
Model B + Disk Interface	£494.00
BBC Dust Covers	£3.95
	+ £1.00 p&p

BBC Compatible Single Disk Drive (100K) £235.00

BBC Compatible Dual Disk Drive (200K) £389.00

BBC Dual Slimline Disk Drive (Double Sided & Density 800K) £799.00

Verbatim Single Sided Diskettes 10 for £22.50

Verbatim Double Sided Diskettes 10 for £39.99

Let us fit a disk interface in 24hrs £95.00

BBC MONITORS

14" RGB Microvitec Colour Monitor (as used in the BBC Computer Prog.) £284.00

RGB Lead for above £4.95

12" Zenith High Res. Green screen

Monitor £95.00

BNC Cable for above £4.95

BBC CASSETTE PLAYER

Official Version inc. Leads, tape counter, Battery/Mains etc. £28.00

Blank Data Cassettes 10 for + £2.00 p&p £3.50

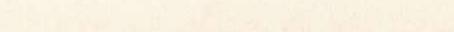
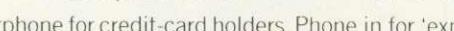
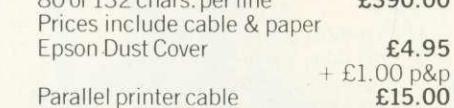
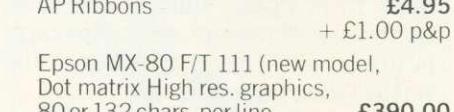
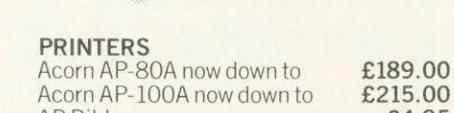
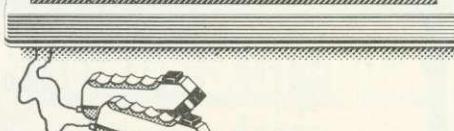
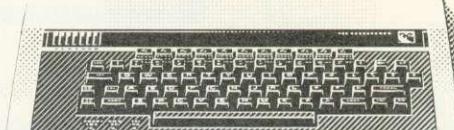
DIN to Jack Lead + £1.30 p&p £3.50

Official Joysticks per pair + £1.00 p&p £13.00

Machines, Disks, Monitors and Printers + £1.30 p&p

Delivered by Courier 1 item £7

2 items £10, 3 or more £13

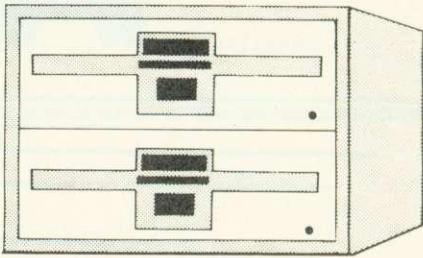


ACORN SOFTWARE FOR BBC

Snapper, Planetoid, Monsters, Rocket Raid, Meteors, Philosophers Quest, Sphinx Adventure, Arcadians, Chess, Lisp Cassette, Forth Cassette, Business Games, Peeko-Computer, Creative Graphics Tape, Graphs & Charts Tape, Desk Diary, Arcade Action, View (on ROM)

All Acornsoft at £9.95 each, except Arcade Action (11.90), Forth & Lisp (16.85 each) and View (£59.95).

THE ACORN ATOM
Large stocks of all Atom kits, machines, disk-packs, ROMs and accessories. Software includes Attomcalc, FORTH, LISP, Adventure etc. Ring or write for list, prices etc.



BOOKS

Practical Programs for BBC & Atom £5.95

BASIC Programming on the BBC £5.95

Micro Programming the 6502 (Zaks) £10.75

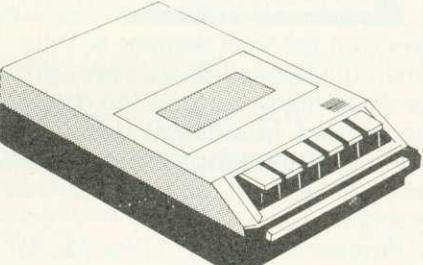
6502 Assembly Language Programming £11.95

BBC Micro Revealed £7.95

Creative Graphics, Graphs & Charts, LISP & FORTH all at £7.50 each

Postage & packing for software & books 1 item £1.00

2 items or more add 50p per unit



SPECIAL WORD PROCESSING PACK – SAVE £150!!

BBC 'B' with 800K disk drive, word processing ROM and Epson printer – list price £1,752. Our price £1,599.

Barclaycard and Access welcomed All prices include VAT

We accept official orders from educational establishments. We specialise in mail-order, all over the world – send large S.A.E. for lists and info pack.

24hr answerphone for credit-card holders. Phone in for 'express' despatch.

ALL PRICES INCLUDE VAT. FOR FURTHER DETAILS AND MAIL ORDER LIST SEND LARGE S.A.E. Open Mon-Sat 9am-6pm. Thurs 9am-1pm

MICRODAGE ELECTRONICS

135 HALE LANE EDGWARE MIDDLESEX HA8 9QP

TEL: 01-959 7119 TELEX 881 3241

```

5DIMTT$(50,8,5)
10Z=TIME
20FOR T=1 TO 50
25REM FOR 50 TEACHERS
30FOR D=1 TO 8
35REM FOR 5 DAYS
40FOR P=1 TO 5
45REM FOR 8 PERIODS
50REM INITIALISE EACH TT LOCATION
80TT$(T,D,P)="0000"
100NEXT P
110NEXT D
120NEXT T
130PRINTTIME-Z;" /100 SEC"

```

Program 3. Same function, but faster

```

5DIMTT$(50,8,5)
10Z=TIME
20FOR T%=1 TO 50
30FOR D%=1 TO 8
40FOR P%=1 TO 5
80TT$(T%,D%,P%)="0000"
100NEXT:NEXT:NEXT
130PRINTTIME-Z;" /100 SEC"

```

Program 2. Simulates teaching timetable

decimals. For example:

FOR X% = 1 TO 10 STEP.1

will not work.

The loop is now reduced to 0.19 seconds – about one-seventh of the original loop speed. Programs 2 and 3, which simulate initialising a timetable for 50 teachers over a week of eight lessons per day, put this saving into perspective. Program 2 executes in 9.5 seconds.

Applying the techniques suggested so far gives us Program 3 – which runs in half the time, and has a larger memory.

The BBC computer can load spaces in program lines.

Type 20 -----

The _'s are single spaces. List the program and you will notice line 20 appears. Spaces use up memory and waste time. To look for spaces in a long program simply load the program, enter mode 4, and type

VDU23,32,255,255,255,255,255,255

Now list the program. All spaces will be shown in white, and it is up to you whether or not to remove them. White spaces before line numbers cannot be removed.

As I illustrated last month, printing and moving shapes across the screen, is easy, provided characters are rationed to one square per shape. But there are many applications where shapes need to be built around more than one character.

Two techniques can be used, which both rely on defining characters that can be printed together to form the compound

shape. Once these characters have been defined the first method prints them sequentially line by line. The second works in the same way as for single characters – printing the whole shape at once. This has the edge over the first method because it is quicker and affords control of printing position.

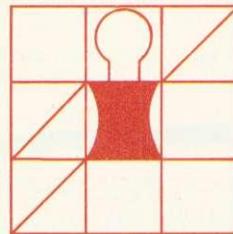


Figure 1. Compound shape

= CHR\$(8) = VDU8
= CHR\$(10) = VDU10

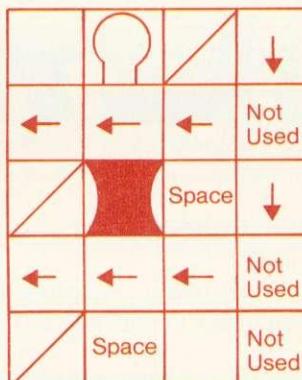


Figure 2. Shape redrawn for string

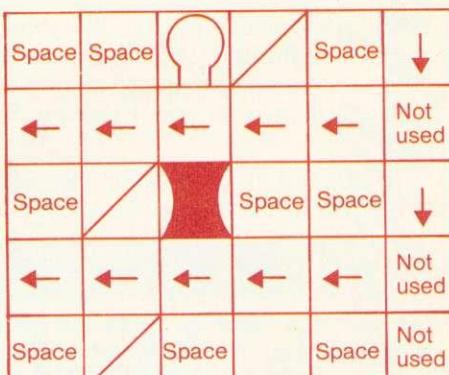


Figure 3. Final version for moving shape

Program 4. Scampering character

```

100 VDU23,224,1,2,4,8,16,32,64,128
110 VDU23,225,128,64,32,16,8,4,2,1
120 VDU23,226,24,102,129,129,129,102,2
4,24
130 VDU23,227,255,255,126,60,60,126,25
5,255
140 VDU23,228,1,1,1,1,1,1,1,1
150 VDU23,229,128,128,128,128,128,128,
128,128
160 DB$=CHR$(10)+STRING$(5,CHR$(8))
170 MAN1$=" "+CHR$(226)+CHR$(224)+" "
180 MAN1$=MAN1$+DB$+" "+CHR$(224)
190 MAN1$=MAN1$+CHR$(227)+" "
200 MAN1$=MAN1$+DB$+" "+CHR$(224)
210 MAN1$=MAN1$+" "+CHR$(229)+" "
230 MAN2$=" "+CHR$(225)+CHR$(226)+" "
240 MAN2$=MAN2$+DB$+" "+CHR$(227)
250 MAN2$=MAN2$+CHR$(225)+" "
260 MAN2$=MAN2$+DB$+" "+CHR$(228)+" "
270 MAN2$=MAN2$+CHR$(225)+" "
290 MODE4:CLS
300 X=1:Y=16:PROC_FWD
310 A$=GET$
```

```

320 IF A$=">" OR A$=".." THEN PROC_FWD
330 IF A$="<" OR A$=",." THEN PROC_BWD
340 GOTO 310
350 DEFPROC FWD
360 IF X+1=34 THEN ENDPROC
370 PRINTTAB(X,Y);MAN2$
380 PROC_DELAY
390 X=X+1
400 PRINTTAB(X,Y);MAN1$
410 PROC_DELAY
420 ENDPROC
430 DEFPROC BWD
440 IF X-1=0 THEN ENDPROC
450 PRINTTAB(X,Y);MAN1$
460 PROC_DELAY
470 X=X-1
480 PRINTTAB(X,Y);MAN2$
490 PROC_DELAY
500 ENDPROC
510 DEFPROC_DELAY
520 LOCAL Z
530 Z=TIME+10
540 REPEAT UNTIL TIME>Z
550 ENDPROC
>
```

program is run, use > or < to move the figure. This is done via the two procedures 'FWD' and 'BWD' at lines 350 and 430 respectively.

To print such a figure on the screen, simply PRINT TAB the string containing the shape to the new position.

Movement must be one square at a time,

```
PRINT TAB(10,15);MAN1$
PRINT TAB(11,15);MAN2$
```

is fine but

```
PRINT TAB(10,15);MAN1$
PRINT TAB(12,15);MAN2$
```

is not. An assortment of links would be scattered in the wake of the figure.

Program 5 is a more efficient routine for creating the figures. It simply replaces the lines 160 to 270 in Program 4.

My preference is for the first version, although as I become better at saving space I shall probably move to the Program 5 routine.

Program 6 in its subsections is a complete game using sound, colour and moving graphics. The procedures are REMed, and so require little explanation. The aim of the game is to destroy the yellow building placed at random on the surface. Simply press the space key to drop the one bomb allotted to each flight.

Program 7 draws three circles in flashing colours, so that the finished pattern pulsates. It must be run in mode 2. Program 8 converts Program 7 to be used as the background to an advertising board. The name of the advertiser fits into A\$ in line 370 and the products being sold follow on from line 820.

Flashing colours are the first step to animated graphic shapes. To achieve this effect, the shape required is plotted; using DRAW, MOVE, and PLOT 85 commands, but is coded by a VDU 19 command to be the same colour as the background.

The shape can then be plotted in several positions, and because the plotting is all in the background colour, the screen is left clear.

To move the shape simply use a VDU 19 command to alter the colour of the shapes in turn, making each stand out from the background, and making the last shape the same colour as the background.

The number of shapes depends on the number of colours available. In mode 2, there are eight non-flashing colours, so seven shapes could be plotted identically – although coded to be background colours.

The shapes would then flash into existence immediately on execution of a VDU 19 command. One of the most useful areas for this facility is in the apparent expansion/contraction of a shape on the screen. ► page 40

Program 5. More efficient technique for program 4

```

170 DATA32,32,226,224,32,10,8,8,8,8,8
180 DATA32,224,227,32,32,10,8,8,8,8,8
190 DATA32,224,32,229,32
200 MAN1$="" : FOR X=1 TO 27
210 READ J : MAN1$=MAN1$+CHR$(J)
220 NEXT
230 DATA32,225,226,32,32,10,8,8,8,8,8
240 DATA32,32,227,225,32,10,8,8,8,8,8
250 DATA32,228,32,225,32
260 MAN2$="" : FOR X=1 TO 27
270 READ J : MAN2$=MAN2$+CHR$(J)
280 NEXT
>
```

THE ACORN SPECIALISTS

ATOM & BBC MICROS

- Upgrades • Add-ons • Books
- Peripherals • Software

EX STOCK

ACORN SOFTWARE BUG-BYTE PROGRAM POWER

Available over the counter.

MAIN **BBC** AGENT FOR
WARRANTY REPAIRS & SERVICE



BITS & BYTES

44 Fore St. Ilfracombe, Nth Devon. Tel: (0271) 62801

ACORN DEALERS, BBC, DRAGON, VIDEO GENIE SALES & SERVICE

Atom Micros

Colour Monitors

Seikosha GP100A
Printers

Monitors - 12" B/W

Monitors - 12" Green

5 1/4" Disc Drives
(C/W P.S.U. & CASE)

BBC Upgrade Kits

BBC printer interfaces

5 1/4" Floppy Discs

C-12 Cassette Tapes

Cassette Recorders

Continuous Stationery
Software

Software
written to order

REPAIRS & SERVICE

To all Micros

ADVENTURE

BBC Micro 32K

Xanadu Adventure

You've never played an Adventure like this before ! You can play it as a normal one-player Adventure or you play it with someone else. With two players you take it in turns to explore. Each player buys his provisions and weapons, and then you can explore, making (and breaking) an alliance as you wish. As allies, you explore together and your combined strength helps you in fights with monsters. If you're not allies, you can fight one another and steal each other's treasures and artifacts.

Explore the caves and castle of Xanadu: over 100 locations, lots of treasures and monsters, in different places each time you play. High speed save and restore. Written in assembler, with highly compressed data for a really big and difficult Adventure.

£7.75 1200 baud cassette. 300 baud available on request.

Acorn Atom 12K

Atom Adventure

A traditional Adventure in caves and a castle. A best-seller from Hopesoft for 15 months. Now only £5.75.

Pirate Island

Can you get your treasure back to your ship ? Beware of the crocodile and the natives ! Don't dig for treasure till you've read the map !

"An excellent piece of software":
Computer & Video Games. £6.75

HOPESOFT

Hope Cottage, Winterbourne, Newbury, Berks RG16 8BB

SWAY

THE ATOM MAGIC BOOK
By Mike Lord. A wealth of games and other programs: storing speech in your ATOM, converting programs written in other BASICs, and many more useful software & hardware tips. £5.50

GETTING ACQUAINTED WITH YOUR ACORN ATOM
By Tim Hartnell & Trevor Sharples. 80 programs including draughts. £7.95

PRACTICAL PROGRAMS FOR THE BBC COMPUTER & ACORN ATOM
By David Johnson-Davies. £5.95

ATOM CASSETTES
We stock a selection of the best: our latest being CAAD: Muncher + Mancala + Target + LIFE 7K. 4 great programs on one cassette for only £6.00

RAM FOR YOUR ATOM (Or other 1MHz 6502/68XX machine)
16 or 32 Bytes: expand your ATOM to 28 or 38K RAM; ideal for Word Processing, Chess programs & Business software. Compatible with other Atom software & hardware including the disc drive. To fit inside the ATOM or Eurocard rack mounting. Some types run from a single +5V supply. S.a.e. for details.

NEW!! ATOM ROAM BOARD MZ165 £35.00 inclusive
Allows software switching between up to 3 utility ROMs and also 4K RAM fitted so you can load your own 'utility' programs from tape or disc. Simple plugs into sockets on ATOM board.

All prices inclusive of U.K. P & P & VAT where applicable. Overseas customers please add £1.50 surface mail.

TIMEDATA Ltd. Dept 1
57 Swallowdale, Basildon, Essex SS16 5JG
Tel: (0268) 411125 (Mon-Fri)

Program 6. The aim of the game is to destroy the yellow building using a bomb. It is well REM'd and explained in

```

100REM BOMBER
110REM J.TELFORD
120REM SIMPLE DEMO OF
130REM MOVING GRAPHICS
140REM IN A GAME FORMAT.
150:
160REM MAIN GAME
170:
180ON ERROR GOTO360
190PROC_TITLE
200PROC_INITIALISE
210REPEAT
220H=0
230REM** START GAME**
240MODE5
250FOR Plane = 1 TO NF
260PROC_Setupflight
270PROC_Drawland
280PROC_Flight_Info
290PROC_Early_Warning
300PROC_Move_Plane
310NEXT Plane
320MODE7
330PROC_RESULTS
340PROC AGAIN
350UNTIL N%
360MODE7:PRINT'"Bye":END
370:
380:
390:
400DEFFPROC_DROP
410:
420REM BOMB FALLS FROM PLANE
430REM TO GROUND.
440:
450FORBD=3TO24
460PRINTTAB(PP+1,BD);BS
470:
480REM WITH SOUND
490:
500PROC_WHISTLE
510:
520REMEMBER TO ERASE IMAGES OF BOMB
530:
540PRINTTAB(PP+1,BD);"
550NEXT
560:
570REM SET UP EXPLOSION COLOUR
580REM FLASHING RED/CYAN
590:
600VDU19,1,9,0,:COLOUR1
610:
620REM AND PRINT EXPLOSION
630:
640PRINTTAB(PP,25);EX$
```

650:

660REM SET NORMAL COLOUR

670REM BEFORE I FORGET

680:

690COLOUR3

700:

```

710REM CHECK FOR A YELLOW TARGET
720REM IF IT HAS A DIFFERENT COLOUR
730REM THEN TARGET IS HIT.
740:
750IFPOINT(LONGIT,UPIT)>>3 THEN PROC_
WIN ELSE SOUND &10,1,107,30
760:
770REM ONLY 1 BOMB PER FLIGHT
780:
790BOMB=0
800ENDPROC
810DEFFPROC_WHISTLE
820SOUND&011,(-3+(BD/2*-1)),150-BD,1
830SOUND&012,(-3+(BD/2*-1)),150-BD,1
840ENDPROC
850DEFFPROC_INITIALISE
860:
870REM SET FAST FLASHING RATES
880:
890*FX10,2
900*FX9,2
910:
920REM SET COLOURS UP
930:
940VDU19,0,7,0;
950VDU19,1,9,0;
960VDU19,2,2,0;
970VDU19,3,7,0;
980VDU19,128,4,0;
990:
1000REM SET EXPLOSION ENVELOPE
1010:
1020ENVELOPE1,1,0,0,0,0,0,0,5,126,0,-5
,40,126
1030COLOUR128
1040:
1050REM SET 10 FLIGHTS
1060:
1070NF=10
1080:
1090REM DEFINE GRAPHICS FOR THE
1100REM 4 MAIN PROGRAM SHAPES.
1110:
1120PROC_PLANE
1130PROC_BOMB
1140PROC_LANDSCAPE
1150PROC_EXPLOSION
1160ENDPROC
1170:
1180DEFFPROC_PLANE
1190:
1200REM DEFINE SINGLE CHR GAPHICS
1210REM TO MAKE UP PLANE
1220:
1230VDU23,224,192,224,240,248,255,129,
255,255
1240VDU23,225,0,0,0,0,255,240,255,255
1250VDU23,226,0,0,24,60,255,3,255,255
1260VDU23,227,0,0,0,0,192,240,240,192
1270:
1280REM PUT TOGETHER INTO A$
1290:
1300A$=" "+CHR$(224)+CHR$(225)
1310A$=A$+CHR$(226)+CHR$(227)
1320ENDPROC
1330:
```

```

134ØDEFPROC_BOMB
135Ø:
136ØREM DEFINE BOMB SHAPE
137Ø:
138ØVDU23,228,65,42,28,8,28,62,28,8
139Ø:
140ØREM PUT INTO BS FOR EASY USE
141Ø:
142ØB$=CHR$(228)
143ØENDPROC
144Ø:
145ØDEFPROC_LANDSCAPE
146Ø:
147ØREM DEFINE SINGLE CHR GRAPHICS
148ØREM TO MAKE UP LANDSCAPE
149Ø:
150ØVDU23,229,Ø,Ø,Ø,Ø,255,255,255,255
151ØVDU23,23Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
152ØVDU23,231,255,255,255,255,255,255,255
153ØVDU23,232,8,28,42,8,28,42,8,8
154ØVDU23,233,192,192,192,192,192,255,255
255,255
155ØVDU23,233,192,192,192,192,255,255,255
156ØVDU23,234,7,7,7,7,255,255,255,255
157Ø:
158ØREM MAKE THEM AVAILABLE IN AN
159ØREM ARRAY CALLED LS$( )
160Ø:
161ØDIMLS$(6):FORX=1TO6:LS$(X)=CHR$(22
8+X):NEXT
162ØENDPROC
163Ø:
164ØDEFPROC_EXPLOSION
165Ø:
166ØREM DEFINE SINGLE CHR GRAPHICS
167ØREM TO MAKE UP EXPLOSION
168Ø:
169ØVDU23,235,255,255,255,Ø,Ø,Ø,Ø,Ø
170ØVDU23,236,4,2,41,24,7Ø,49,12,255
171ØVDU23,237,28,28,28,62,62,19Ø,127,2
55
172ØVDU23,239,28,28,28,28,28,28,28,28
173ØVDU23,24Ø,28,127,127,255,255,127,6
2,28
174ØVDU23,241,28,126,255,255,255,255,1
26,6Ø
175ØVDU23,242,28,254,254,255,255,254,6
2,28
176ØVDU23,238,16,32,74,14Ø,48,198,24,2
55
177Ø:
178ØREM PUT SINGLE CHR GRAPHICS
179ØREM TOGETHER TO FORM EXPLOSION
180Ø:
181ØEX$=CHR$(236)+CHR$(237)+CHR$(238)
182ØEX$=EX$+CHR$(11)+CHR$(8)+CHR$(8)
183ØEX$=EX$+CHR$(239)+CHR$(11)+CHR$(8)
184ØEX$=EX$+CHR$(239)+CHR$(11)+CHR$(8)
185ØEX$=EX$+CHR$(239)+CHR$(11)+CHR$(8)
186ØEX$=EX$+CHR$(8)+CHR$(24Ø)
187ØEX$=EX$+CHR$(241)+CHR$(242)
188ØENDPROC
189ØDEFPROC_TITLE
190Ø:

```

```

191ØREM YELLOW, DOUBLE HEIGHT
192Ø:
193ØCLS
194ØPRINT TAB(14,1Ø);CHR$141;CHR$131;"Bomber"
195ØPRINT TAB(14,11);CHR$141;CHR$131;"Bomber"
196ØPROC_SPACE
197ØENDPROC
198ØDEFPROC_Setupflight
199ØBOMB=-1:REM THERE IS A BOMB
2ØØØ:
2Ø1ØREM BLUE SKY
2Ø2Ø:
2Ø3ØVDU19,128,4;Ø;
2Ø4ØCOLOUR128:CLS
2Ø5Ø:
2Ø6ØREM LAND WILL BE GREEN
2Ø7Ø:
2Ø8ØVDU19,2,2;Ø;
2Ø9ØCOLOUR2
21ØENDPROC
211ØDEFPROC_Drawland
212Ø:
213ØREM RANDOM SHAPES IN GREEN
214ØREM DRAWN ACROSS SCREEN
215Ø:
216ØFORX=ØTO19
217ØPRINTTAB(X,25);LSS(RND(6))
218ØPRINTTAB(X,26);CHR$(235)
219ØNEXT
22ØØ:
221ØREM RANDOM POS. FOR TARGET
222Ø:
223ØPT=RND(14)
224Ø:
225ØREM TARGET IS YELLOW
226Ø:
227ØVDU19,3,3;Ø;:COLOUR3
228Ø:
229ØREM PRINT TARGET
230Ø:
231ØPRINTTAB(PT+3,25);CHR$(231)
232Ø:
233ØREM FIND POS. OF TARGET
234ØREM IN GRAPHICS NUMBERS
235Ø:
236ØLONGIT=128Ø/2Ø*(PT+3)+32
237ØUPIT=1Ø24/32*(32-25)-16
238ØENDPROC
239Ø:
24ØØDEFPROC_Flight_Info
241ØPRINTTAB(1,28);"FLIGHT NO: ";Plane
242ØPRINTTAB(1,3Ø);"HITS:- " ;H
243ØENDPROC
244Ø:
245ØDEFPROC_Early_Warning
246ØFORWT=1 TO 1ØØØ:NEXT
247ØVDU7:REM READY TO FLY
248ØFORWT=1 TO 2ØØØ:NEXT
249ØENDPROC
25ØØ:
251ØDEFPROC_Move_Plane
252Ø:
253ØREM PLANE IS YELLOW
254Ø:

```

```

255$COLOUR3
256$:
257$REM ANTICIPATION NOT ALLOWED
258$:
259$*FX15,$
260$:
261$REM MOVE PLANE POSITION (PP)
262$REM ACROSS SCREEN
263$:
264$FOR PP=1 TO 15
265$PRINTTAB(PP,2);A$
266$:
267$REM GET A KEY
268$:
269$BD$=INKEY$(0)
270$:
271$REM TEST FOR DROP BOMB COMMAND
272$REM AND FOR A BOMB TO DROP
273$:
274$IF BD$=" "AND BOMB THEN PROC_DROP:G
0TO28$:
275$:
276$REM IF NOT DROPPED WAIT THEN
277$REM CONTINUE.
278$:
279$FOR WT=1 TO 1$NEXT
280$NEXT
281$:
282$REM BLANK LAST PLANE IMAGE
283$:
284$PRINTTAB(PP,2);"
285$:
286$REM RELAX AT END OF A FLIGHT
287$:
288$FOR WT = 1 TO 2$NEXT
289$ENDPROC
290$ DEFPROC SPACE
291$ PRINTTAB(3,24);;"Press the SPACE B
AR to continue";:FX15,$
292$ REPEAT UNTIL GET$=" "
293$ ENDPROC
294$:
295$DEFPROC RESULTS
296$CLS
297$PRINT"****You had ";H;" hits,";
298$PRINT" from ";NF;" flights."
299$IF H = NF THEN PRINT" Excellent w
ork"
300$IF H = NF-1 OR H = NF-2 THENPRINT'
" Very good work"
301$IF H = NF-3 OR H=NF-4 THENPRINT'
" Good work"
302$IF H=NF-5 OR H=NF-6 THENPRINT" Ave
rage!!!"
303$IF H=NF-7 OR H=NF-8 THENPRINT" You
need practice"
304$IF H=NF-9 OR H=NF-10 THEN PRINT" P
oor...give up!"
305$PROC SPACE
306$ENDPROC
307$:
308$DEFPROC AGAIN
309$CLS
310$PRINT"****Do you want another go?"
311$PRINT"Type Y or N"

```

```

312$PRINT"then press RETURN. > ";
313$*FX15,$
314$a$=GET$
315$:
316$REM SET UP ONLY FOR Y/N
317$:
318$N%=1
319$IF a$="Y" OR a$="y" THEN N%=$
320$IF a$="N" OR a$="n" THEN N%=-1
321$IF N%=-1 THEN 314$
322$PRINTa$;
323$:
324$REM WAIT FOR RETURN
325$:
326$a$=GET$: IF a$<>CHR$(13) THEN 326$
327$:
328$REM N% SET TO $ FOR Y
329$REM OR -1 FOR N
330$:
331$ENDPROC
332$:
333$DEFPROC WIN
334$:
335$REM GENERATE WIN SOUND
336$:
337$SOUND&$1$,1,1$,$
338$:
339$REM INCREMENT NO OF HITS
340$:
341$H=H+1
342$:
343$REM IMMEDIATE SCORE UPDATE
344$:
345$PROC Flight_Info
346$ENDPROC

```

Program 7. Throbbing colours

```

100REM THROBBING COLOURS
110:
120REM START WITH COLOUR 16
130:
140COL=16
150:
160REM USE MODE 2 FOR MAX COLOURS
170:
180MODE2
190REM BACKGROUND TEXT COLOUR IS RED
200COLOUR129:CLS
210:
220REM DRAW 3 MULTICOLOURED CIRCLES
230REM WHICH INTERLOCK
240REM USE THE FLASHING COLOURS
250:
260REPEAT
270COL=COL-1
280GCOL 0, COL

```

```

290PROC CIRCLE(312,512, COL*20, "F")
300PROC CIRCLE(612,512, COL*20, "F")
310PROC CIRCLE(912,512, COL*20, "F")
320UNTIL COL = 9
330:
340END
9300DEFPROC CIRCLE(X, Y, R, F$)
9305LOCAL Z
9310 IF F$="F"THEN 9335
9315MOVE X+R, Y
9320 FOR Z = 2*PI TO -.2 STEP-.2
9325DRAW X+(R*COS(Z)), Y+(R*SIN(Z))
9330NEXT:ENDPROC
9335MOVE X, Y
9340DRAW X+R, Y
9345 FOR Z = 2*PI TO -.2 STEP-.2
9350PLOT85, X+(R*COS(Z)), Y+(R*SIN(Z))
9355MOVE X, Y
9360NEXT:ENDPROC

```

ACORN STYLE T-SHIRTS ONLY £2.95



Show the flag with these Acorn real cotton T-Shirts. Send just £3.10 (£2.95 plus 15p post and packaging) and we will despatch one high quality cotton T-Shirt printed in two colours.

Two types available "I'm nuts about Acorn" or just a simple stylish logo, both printed in two colours, three sizes small, medium or large. Just clip the coupon, send the money and we will do the rest.

To Dealer Deals Ltd., 20, Orange Street WC2H 7ED

Please send me (qty) Acorn T-Shirts I enclose cheque/Postal Order for £ payable to Dealer Deals Ltd

NAME

ADDRESS

Please Tick Nuts Logo
Size: Small Med Large

If you would like a mixture of styles and sizes, send your requirements on a separate sheet.

```

100REM ADVERTISING BOARD
340REM NOW POP NAME INTO A$
350REM NO MORE THAN 14 CHARACTERS
360:
370A$="HAYES DECOR"
380:
390REM CYCLE FOREVER THROUGH THE ADS
400:
410REPEAT
420:
430REM GET PRODUCT INTO B$
440:
450READ B$
460:
470REM IF NO MORE GOODS - RESTART
480:
490IF B$ = "END" THEN RESTORE:GOTO450
500:
510REM NOW GET COST
520:
530READ C$
540:
550REM SET COLOURS:-
560REM FOREGROUND FLASH BLUE/YELLOW
570REM BACKGROUND FLASH RED/CYAN
580REM THIS FITS IN WITH
590REM COLOUR OF LAST CIRCLE
600:
610COLOUR11:COLOUR137
620:
630REM NOW CENTRE TEXT ON SCREEN
640:
650PRINTTAB((10-LEN(A$)/2),13);A$
660PRINTTAB((10-LEN(B$)/2),15);B$
670PRINTTAB((10-LEN(C$)/2),17);C$
680:
690REM 10 SECS PER ADVERT
700:
710WT=TIME+1000:REPEAT UNTIL TIME>WT

```

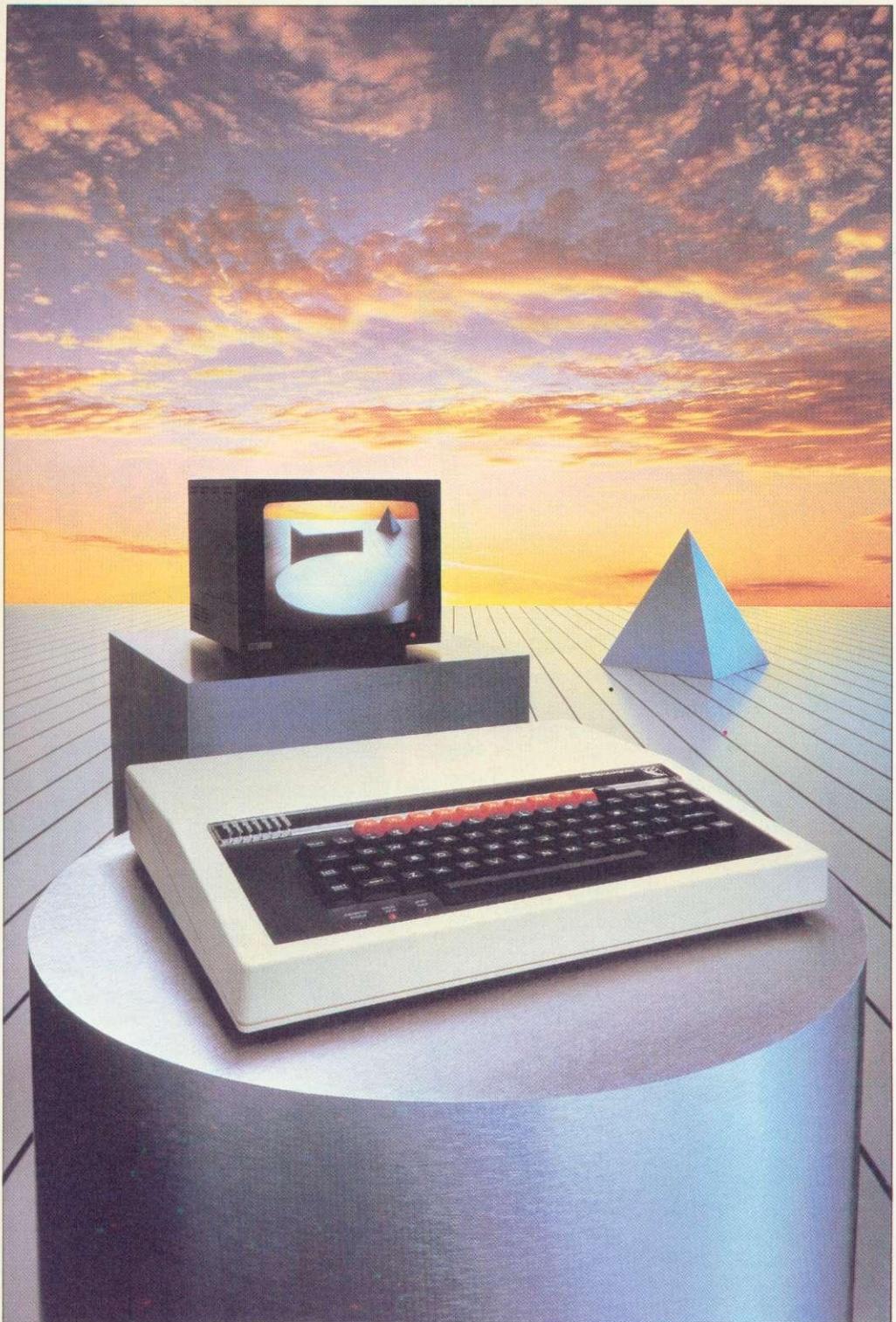
Program 8. Uses program 7 as background for an advertising display

**Next month
Joe Telford's tips
sound a festive
note**

```

720:
730REM RUB OUT TEXT FOR NEXT AD.
740:
750PRINTTAB(2,15),STRING$(15," ")
760PRINTTAB(3,17),STRING$(14," ")
770:
780REM NEVER STOP
790:
800UNTIL FALSE
810:
820REM DATA IN PAIRS...
830REM PRODUCT NAME THEN COST
840REM WITH 'END' AT THE END
850:
860DATA "BATHROOM SUITES"
870DATA "FROM '70"
880DATA "COPPER PIPING"
890DATA "97p per Foot"
900DATA "GUTTERING"
910DATA "80p per Metre"
920DATA "WASH BASINS"
930DATA "FROM '25"
940DATA "GARDEN TOOLS"
950DATA "Low Prices"
960DATA END

```



Broader horizons

BBC Model B Microcomputers are available for immediate despatch by courier to your door.

If you would like to take advantage of our special delivery offer just fill in this coupon, but remember this only applies to the Model B, and only in the UK. Any other items have to be ordered on the standard order form or from a BBC Computer Stockist.

BBC Microcomputer System Offer
c/o Vector Marketing
Dennington Estate
Wellingborough
Northamptonshire NN8 2RL

The BBC Microcomputer System

'Whether your interests lie in business, educational, scientific, control or games applications, this system provides a possibility for expansion which is unparalleled in any other machine available at present,' comments Paul Beverley in the July 1982 edition of *Personal Computer World*.

The BBC Microcomputer can genuinely claim to satisfy the needs of novice and expert alike. It is a fast, powerful system generating high resolution colour graphics and which can synthesise music and speech. The keyboard uses a conventional layout and electric typewriter 'feel'.

You can connect directly* to cassette recorder, domestic television, video monitor, disc drives, printers (dot matrix and daisy wheel) and paddles. Interfaces include RS423, inter-operable with RS232C equipment, and Centronics. There is an 8-bit user port and 1MHz buffered extension bus for a direct link to Prestel and Teletext adaptors and many other expansion units. The Econet system allows numerous machines to share the use of expensive disc drives and printers.

BASIC is used, but plug-in ROM options will allow instant access to other high level languages (including Pascal, FORTH and LISP) and to word processing software.

A feature of the BBC Microcomputer which has attracted widespread interest is the Tube, a design registered by Acorn Computers. The Tube is unique to the BBC Microcomputer and greatly enhances the expandability of the system by providing, via a high speed data channel for the addition of a second processor. A 3MHz 6502 with 64K of RAM will double processing speed; a Z80 extension will make it fully CP/M** compatible.

The BBC Microcomputer is also at the heart of a massive computer education programme. The government has recommended it for use in both primary and secondary schools. The BBC Computer Literacy Project includes two series of television programmes on the use and applications of computers.

There are two versions of the computer. Model A, at £299, offers 16K of RAM and Model B at £399 has 32K of RAM.

For technical specification and order form, send stamped addressed envelope to P.O. Box 7, London W3 6XJ and for details of your nearest stockist ring 01-200 0200.

Please send me by courier _____ BBC Model B Microcomputer(s) at £399 including VAT and delivery.

Cheque enclosed for £_____ payable to BBC Microcomputer System readers a/c or charge
ACCESS BARCLAYCARD

Signed _____

Name _____

Address _____

Postal Code _____

Co Reg No 1403810 VAT No. 215400220

*Model A has a limited range of interfaces but can be upgraded to meet Model B specification.

**CP/M is a registered trade mark of Digital Research.

The BBC Microcomputer is designed, produced and distributed in the UK by Acorn Computers Limited.

EPSON MX80

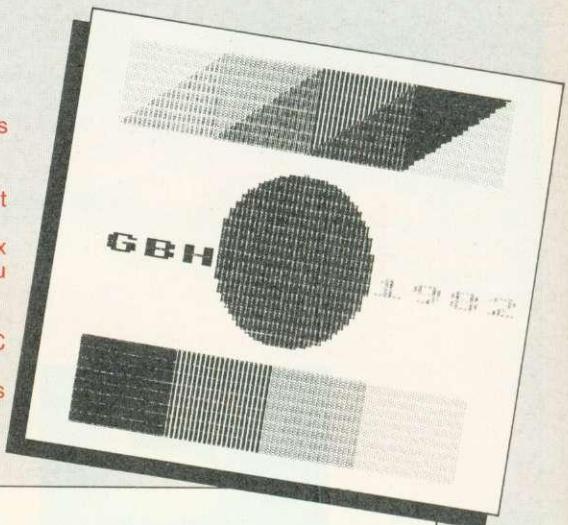
In the October issue of *Acorn User*, George Hill explained the workings of the Epson MX80 F/T2 printer, and gave listings of single colour and two-tone dumps from the BBC micro.

Here is the final listing, to print a seven-tone picture, as in the 'testcard' shown on the right. The program is in Basic, but uses the fast VDU drivers to reproduce a complete screen in less than 30 minutes.

Having stored the program,

numbered from 1000, proceed as follows:

- LOAD your graphics program
- RENUMBER it to ensure that it ends before line 1000
- PRINT~TOP-2 (this returns a hex number, "hexnumber", which you now use to merge the programs)
- *LOAD "BITPRINTn" hexnumber
- Type OLD to reset the BASIC pointers
- Replace the END of your graphics program by GOTO 1000
- RUN and hope!



```

1000 REM * * BITPRINT2 * * MODE 2 * *
1010 REM * Copyright G.B.Hill June 1982 *
1020 REM Seven tone picture dump for EPSON MX-80 F/T2

1030 REM ***variable declaration***
1040 REM X%,Y% screen coordinates
1050 REM P1,P2,P3,P4, stores for screen readout data
1060 DIM C(8,6) :REM C(I,J) used to define characters sent to printer
1070 FOR I=1 TO 6:C(0,I)=0:NEXT
1080 C(1,1)=0:C(1,2)=2:C(1,3)=0:C(1,4)=0:C(1,5)=1:C(1,6)=0
1090 C(2,1)=0:C(2,2)=1:C(2,3)=2:C(2,4)=1:C(2,5)=2:C(2,6)=0
1100 C(3,1)=1:C(3,2)=2:C(3,3)=2:C(3,4)=1:C(3,5)=1:C(3,6)=0
1110 C(4,1)=0:C(4,2)=3:C(4,3)=1:C(4,4)=3:C(4,5)=0:C(4,6)=3
1120 C(5,1)=0:C(5,2)=3:C(5,3)=3:C(5,4)=3:C(5,5)=3:C(5,6)=0
1130 C(6,1)=3:C(6,2)=3:C(6,3)=1:C(6,4)=2:C(6,5)=3:C(6,6)=3
1140 FOR I=1 TO 6:C(7,I)=3:NEXT
1150 REM set up printer,clear print buffer,restore screen 0
1160 PROCPINTER
1170 REM scan screen and send data to printer
1180 PROCSAN
1190 REM finishing routine
1200 PROCDONE
1210 END
1220 DEFPROCPINTER
1230 MOVE 0,0 :REM zero graphics cursor
1240 *FX 5,2
1250 REM select RS423
1260 *FX 8,4
1270 REM 1200 baud
1280 VDU2:PRINT:VDU3,1,10,1,10,1,10 :REM clear print buffer
1290 VDU1,27,1,65,1,8 :REM Linefeed setting,ESC,A,8
1300 ENDPROC
1310 DEFPROCSAN
1320 FOR Y%=-1023 TO 0 STEP -16
1330   VDU1,27,1,76,1,192,1,3
1340     FOR X%=0 TO 1279 STEP 8
1350       P1=0:P2=0:P3=0:P4=0
1360       P1=POINT(X%,Y%-12):P1=P1+8:P1=P1 MOD 8
1370       P2=POINT(X%,Y%-8):P2=P2+8:P2=P2 MOD 8
1380       P3=POINT(X%,Y%-4):P3=P3+8:P3=P3 MOD 8
1390       P4=POINT(X%,Y%):P4=P4+8:P4=P4 MOD 8
1400       FOR J%=1 TO 6
1410         VDU1,(C(P1,J%)+4*C(P2,J%)+16*C(P3,J%)+64*C(P4,J%))
1420       NEXT
1430     NEXT
1440   VDU1,10 :REM Linefeed
1450   NEXT
1460 ENDPROC
1470 DEFPROCDONE
1480 VDU1,27,1,50 :REM Normal linefeed
1490 VDU 1,27,1,70 :REM Cancel condensed characters
1500 VDU1,12,1,7 :REM formfeed and beep
1510 VDUS
1520 PLOT 4,200,224
1530 PRINT"Picture complete."
1540 PLOT 4,560,160
1550 PRINT"BYE"
1560 VDU4,26 :REM separate graphics cursor, restore windows
1570 VDU31,0,31 :REM text cursor to bottom of screen
1580 ENDPROC

```

NEW from our BBC micros accessories range



Light Pen

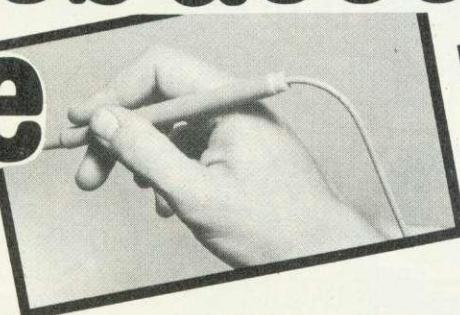
A complete program with plug-in light pen that will draw on the screen. Ideal for games, graphics origination and commercial uses.

Fabulous value at £30 plus VAT plus £1 p & p.

Graphics Tablet

Transfer your technical drawings or designs from pad to screen in seconds, and in colour. Size 30" square. Measures distances and areas and moves drawings on screen.

Only £75 plus VAT plus £4.50 p & p.



128K Ram Pack

Simple plug-in memory expansion board, addressable for your own programs.

Introductory offer £230 plus VAT plus £1 p & p.

BBC HARDWARE

Model 'A'

16K RAM 32K ROM. Full colour, high resolution graphics.

£299

(+ £7 p&p)

Model 'B'

32K RAM 32K ROM 16 Colour Graphics Tablet.

£399

(+ £7 p&p)

£69

£130

£265

£270

£95

£13 p. pair

£288

(+ £4.50 p&p)

£399

(+ £4.50 p&p)

£15

(+ £1 p



Scouse micros

The BBC Microgroup Liverpool holds meetings on the third Thursday of each month at Stem, 117 Grove Street, Liverpool (by the corner with Myrtle St) from 7.30 to 9.30 pm. Acorn Atoms are welcome. The group is affiliated to the Merseyside Microcomputer Group c/o Fred Shaw, 14 Albany Avenue, Eccleston Park, Prescot, Merseyside, L34 2QW, to whom enquiries should be vectored.

Preston Poly

The Preston Area BBC Micro User Group has recently been set up and aims to start a software library and a newsletter. Members'

software will be evaluated by the club!

Meetings take place at Preston Polytechnic in room F2 at the moment, although this may change. The next meeting is 24 November. Anybody wishing to contact the group should send for details from: Mr D. Coulter, Preston Area BBC Microcomputer User Group, 8 Briar Grove, Ingol, Preston PR2 3UR

43316. The address is Godstone Road, Caterham, Surrey CR3 6RE.

Brum Beeb radio

Recently the West Midlands Computer Group was established with a monthly magazine - Databus. Meetings are being planned, which will be held in the centre of Birmingham and the group is to be represented on a monthly radio programme to be broadcast on Radio WM - the local BBC station.

For details, contact the membership secretary, 12 Apsley Road, Oldbury, West Midlands B68 0QZ.

Databus is edited by Mr D.J. Thompson at 130 Golden Cross Lane, Catshill, Bromsgrove, Worcs.

Mics for leisure

Caterham Leisure Centre has started a Computer Club. Meetings are held on Thursday nights at 8.00 pm. The centre has a model B BBC computer available. For details ring the centre manager Mr M. Goldsborough on Caterham 48304 or Mr. J. Hodges on Caterham

Anybody else out there? Contact Acorn User, 53 Bedford Square, London WC1

CLUB CONTACTS

● Mr D. Coulter
Preston BBC User Group
8 Briar Grove
Ingol
Preston PR2 3UR

● Mr D.L. Evans
23 Hitchin Road,
Henlow Camp
Bedfordshire

● Mr J. Price
Bedford House
27-28 St George's Road
Brighton
Sussex

● Mr J. Craig
National BBC User Group
40 Mount Pleasant Avenue
Wells,
Somerset BA5 2JQ

● Mr P. Frost
Atom Users Group
18 Frankwell Drive
Potters Green
Coventry CV2 2FB

● Mr R. Luff
Kingbee
54 Arlington Close
Kingswinford
West Midlands

● Steve White
Atom/BBC User Group
c/o Superior Systems Ltd
178 West Street
Sheffield
Tel: (0742) 755005

● Mr C. Rutter
Medway Atom Users Club
St John Fisher School
Ordnance Street
Chatham
Kent

● Mr B. Carroll
The Cottage, 42 Manor Road
Aldershot GU11 3DG

● **Beebug**
374 Wandsworth Road
London SW8 4TE

● Richard Green
Muse
22 Tennyson Avenue
Hull HU5 3TW

● **West Midlands Computer Group**
12 Apsley Road
Oldbury
West Midlands B68 0QZ

● Mr J. Ashurst
Acorn Computer Users Group
Abraham Moss Centre
Crescent Road
Manchester 8

● Rupert Steele
Amateur Computer Club
St John's College
Oxford OX1 3JP

● **Liverpool BBC Microgroup**
c/o Fred Shaw
14 Albany Avenue
Eccleston Park
Prescot
Merseyside L34 2QW

● Robin Bradbeer
Association of London Computer Clubs
Polytechnic of North London
Holloway
London N7 8DB

● Mr T.G. Meredith
Acorn Atom User Group
Sheerwater,
Yealm View Road
Newton Ferrers
South Devon

● Mr C.M. Rutter
Manchester Atom Users Group
3 Leopold Avenue
Withington
Manchester M20 8JG

● **Muse (for teachers)**
Freepost
Bromsgrove
Worcs B61 7BR

● N.P. (Bazyle) Butcher
Harrow Computer Group
16 St Peter's Close
Bushey Heath
Watford WD2 3LG

● Mr P. Beverley
Norwich Area Acorn User Group
Room 12a, Norwich City College
Ipswich Road
Norwich NR2 2LJ

● Mr M. Christiansen
BBC Users Group
Marienlystveien - Stavne
N-7000 Trondheim
Norway

● Paul Barbour
Laserbug
4 Station Bridge
Woodgrange Road
London E7 0NE

● Peter Smith
Fareham and Portchester Amateur Computer Club
23 Sandy Close
Petersfield
Hants.

● **Computer Club**
Caterham Leisure Centre
Godstone Road
Caterham
Surrey CR3 6RE
Tel: Caterham 48304/43316

PROGRAM POWER MICRO POWER

Attention all ATOM Owners !!

Announcing the Software

SPECTACULAR

from

PROGRAM
POWER

MACHINE CODE MONITOR/ DISASSEMBLER

*SINGLE STEP with REGISTER

- *DISPLAY
- *BREAKPOINT handling routines
- *Tabulation Memory Dump with 'on-screen' Editing (printer option)
- *Memory Display - Hex, ASCII, Screen
- *Code, Decimal & Binary
- *SEARCH - Hex or ASCII string
- *INTELLIGENT COPY
- *COMPARISON of two memory blocks
- *DISASSEMBLER (full feature)
- *INCREDIBLE PRICE - ONLY £14.50

TWO
NEW
4K ROMS

SUPER TOOLBOX

*SUPER-FAST Cassette Operation System with error checking, verify and append routines in addition to original 300/1200 baud.

*TOOLKIT functions - AUTO, RENUMBER, HELP, FIND, SPACE, APPEND, MEM, VAR, LVAR, DUMP, ZERO, HEX, IHEX, DELETE.

OTHER FEATURES - Flashing Cursor, 2-key Rollover, Repeat Key, Fast Repeat, *SUPER LOW PRICE - ONLY £14.50.

PROGRAMMERS TOOLBOX

(PACKED 4K EPROM) £24.50

★ 1200 BAUD CASSETTE OPERATING SYSTEM

★ VISIBLE LOAD & SAVE

★ 29 additional BASIC & TOOLKIT COMMANDS

ROM SELECTOR BOARD

Suffering from congestion? Switch between up to 4 ROMS located at Hex A000. Assembled and tested unit with compact professionally produced PCB and good quality components. Fits easily into the Utility Socket (IIC 24). The additional ROMS above make having a selector board at only £19.50 even more essential!

MACHINE CODE PROGRAM PRICES ARE TUMBLING!!

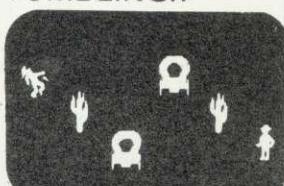


Chess (12K) Improved graphics, plays black or white, mid game level changes, look ahead up to eight moves, offensive, normal and defensive play. Ten sub-levels, castling, 'En passant' by player. Rejects illegal moves. Take back moves and action replay with take over. Set up problem games. £6.95.

Hyperfire (12K colour) Aliens have over-run six planets. Object to clear them. Super high-speed action. Four defender ships. Hit alien fuel dumps and alien ships. Aircraft radar shows placement of approaching ships. Thruster control - including diagonal movement. Best sound effects yet! £6.95. **Dog Fight** (12K) Exciting, two player combat program - in HI RES Graphics. Defend your aircraft carriers and attack your opponents. Engage the enemy fighters in a battle to the death £6.95.



ASTROBIRDS (12K) NEW version of this incredible GALAXIAN type game. Fantastic sound effects. Screaming missiles & swooping bird men. NOW DOUBLE SPEED OPTION. £5.95. **ADVENTURE** (12K-NOT M/C) ALL THE INTRIGUE AND FRUSTRATION OF A MAIN-FRAME ADVENTURE! Great skill and imagination are required to play this excellent game and you may still never exhaust all the possibilities £6.95.



Cowboy Shoot-Out (12K) Full feature, two player, arcade shooting game. Superb graphics and sound £5.95. **Stock-Car** (12K) HI RES. Two Player contest around any of 16 different race tracks. Steering, acceleration and braking controls. Set the level of difficulty for driver and choose the no. of laps £5.95.

WRITTEN ANY PROGRAMS!
WE PAY 20% ROYALTIES
FOR ATOM, NASCOM &
BBC MICRO PROGRAMS

SPACE FIGHTER (12K COLOUR) Super high speed "Defender" game. 5 types of intelligent aliens. Repeating laser cannon, smart bombs, hi-score, rankings, bonus points, 6 skill levels. Exciting sound effects £6.95.

INVADER FORCE (12K) Terrific version of 'Space Invader' 4 types of invaders, mother ship, great sound, hi-score, 6 skill levels £5.95.

ATOMSTORE (12K-NOT M/C) Database filing & printing program, excellent value at only £6.95.

**PLEASE NOTE: WE
ARE AUTHORISED**

**DEALERS FOR ACORN ATOM,
BBC MICRO & DRAGON 32**

Please add 55p order P & P + VAT at 15%

MICRO POWER LTD.
8/8A REGENT STREET,
CHAPEL ALLERTON
LEEDS LS7 4PE.
Tel. (0532) 683186

**ATOM
SPECIAL OFFER**
Deduct £1 per cassette
when ordering
two or more.



SOFTWARE FOR THE B.B.C. MICRO
FROM....

COMPUTER CONCEPTS



LOGO II MODEL B

The first implementation on the BBC Micro of the graphics language LOGO. This language is now very popular in American schools as it is an ideal educational program. It can graphically demonstrate the ideas of defined procedures, sub routines, loops and even recursive programming. This program will give an excellent introduction to LOGO language, for young and old alike!



£10.00
+VAT



HITCH-HIKER

MODEL B

'Hitch-Hiker' is a great adventure game based on characters from the book 'Hitch-Hiker's Guide to the Galaxy'. A fascinating game to test your skill and wits whilst trying to collect five objects scattered around the Universe located in such places as the 'Restaurant at the end of the Universe', 'Arthur Dent's House' and Belteguese Spacedrome'. Directions can be found in the clues. An intriguing game that can create hours of fun.

£5.80
+VAT

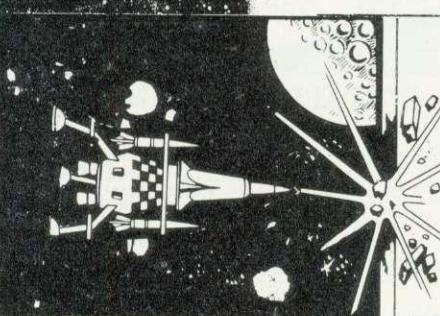


SPACE HAWKS

MODEL B

A great arcade type game similar to the popular 'space invaders'. A game of skill and speed. Armed with photon bolts to defend yourself — try to beat off the attack of the invaders and flapping space hawks. Makes full use of high resolution graphics.

£7.80
+VAT

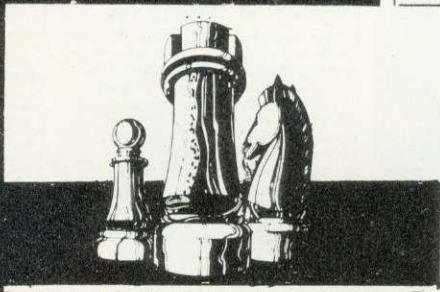


ASTEROID BELT

MODEL A OR B

A great new space game practically identical to the arcade original. You are stuck in the middle of a cloud of asteroids against which you have no protection — your only chance of survival is to destroy the asteroids with your photon bolts. Manoeuvring can be achieved by rotating and thrusting. As a last resort you can 'hyper-space', immediately transporting you to a random position. An inspired piece of machine code programming producing one of the most exciting games around.

£7.80
+VAT



CHESS MODEL B

Another machine code program for the Model B. This game has a host of facilities. An enormous range of skill levels — you can alter such parameters as the number of moves that the program looks ahead, the speed, and sub-levels, etc. The computer can act as an umpire for two players. It can even play against itself. This program uses high resolution colour graphics to display the board and its pieces. An excellent introduction to beginners though it still gives the experienced player a real challenge.

£10.00
+VAT

PLEASE SEND ME: _____

I enclose £ _____

NAME: _____

ADDRESS: _____

**in our opinion the best
B.B.C. software in town!**

Dept AC4

**16 Wayside, Chipperfield,
Herts, WD4 9JJ. tel (09277) 69727**

Send a S.A.E. to get the latest details of our software.



GRAPHICS ROUTINES

GRAPHICS ROUTINES

GRAPHICS ROUTINES

Table 1. Summary of single key commands available after the initial display in zero mode of program 1

- A Set the starting page of the data to be worked on.
- C Clear one of the graphics modes. Press one of keys 0 to 8 to specify mode (as shown in table 2).
- D Move down. (SHIFT D for continuous motion until CTRL is pressed.)
- E Exchange pictures. Press either key 0 to allow input of the page addresses from the keyboard, or keys 1 to 6 to select two of the six 1k pictures (mode 1a) to be exchanged.
- F Repeats the zero mode demonstration which was shown at the start of the program.
- Change graphics mode without clearing. Press one of keys 0 to 8.
- H Change height of picture being worked on by routines.
- I Invert the picture.
- L Move left. (SHIFT L for continuous motion until CTRL is pressed.)
- M Mirror image = lateral inversion = left-right inversion.
- P An example of animated graphics.
- Q Colour changes – press key 1, 2 or 3.
- R Move right. (SHIFT R for continuous motion.)
- S Save a view into another area of memory – uses same format as exchange routine.
- T Draw a train.
- U Move upwards. (SHIFT U for continuous motion.)
- W Change width of picture.
- X Horizontal colour bars in mode 1a.
- Y Vertical colour bars in mode 1a.
- Z Coloured squares in mode 1a.
- SHIFT S – automatically standardises the height and width of the current graphics mode.

Up, down, left, right, change colour – these machine code routines by Paul Beverley make it all possible. Just type them in and follow the instructions

This article describes a series of machine code routines for manipulating Atom graphics – both colour and black and white. They provide rotations (up, down, left and right), inversions (up/down and left/right), global colour changes, and block moves of memory for exchanging views.

Machine code has the advantage over Basic because it lets you work fast enough to achieve reasonable animation effects – but don't panic if you have never used machine code before. To use these routines, you only need to be able to type them in and follow the instructions!

The routines are written in what are called assembler mnemonics (program 1). In this form they are vaguely readable, but they occupy over 3½k of memory. Once run, the

assembler routine is turned into the machine code which the computer understands, and only uses just over ½k (589 bytes) leaving a reasonable space for the program which is going to use the routines.

However, there is no need to load and run this every time you want to use the routines. They can be saved in machine code form by saying

*SAVE "M-CODE" 39B0 3BFF

and then re-loaded when you want to use them again by saying

*LOAD "M-CODE"

Program 2 complements the explanations of the routines by showing how they can be used. It would take too long to explain fully the operation of this program, but it is laid out in sections which should

Table 2. Parameters associated with graphics modes

Graphics mode	?#B000 (=?N)	Height (bytes)	Width (bytes)	Memory (k) (x 1024)	Memory (pages) (x 256)	Number used by program
0	0	16	32	½	2	0
1	#30	64	16	1	4	2
2	#70	96	16	1½	6	4
3	#B0	192	16	3	12	6
4	#F0	192	32	6	24	8
1a	#10	64	16	1	4	1
2a	#50	64	32	2	8	3
3a	#90	96	32	3	12	5
4a	#D0	192	32	6	24	7

aid readability. The operating instructions are given in table 1.

The Atom has more different graphics modes than a model B BBC microcomputer – and this can cause problems. It has a total of nine – five in black and white and four in colour. This means you have to provide information on the current mode for the routines to refer to.

The routines could find out directly which is the current mode of graphics by reading memory location #B000 – port A of the 8255 interface adaptor. As can be seen from table 2, it is the upper four bits of this port which determine the mode.

However, to make the routines more flexible, it was decided to use a location in zero page (# 87) to store this number. In other words, to use the current mode, you copy #B000 into #87 (?#87 = ?#B000) and the routines then look at #87.

So by changing the contents of #87, the routine can perform as if the Atom were in a different mode altogether.

Similarly, various other parameters are stored in zero page. The number of horizontal lines on the screen (16 to 192) is stored at #85, and the width of the screen in terms of bytes (16 or 32) is stored at #84.

For routines which move whole chunks of memory around, the start addresses of the two areas of memory are stored at #80, #81 and #82, #83, in the usual 6502 notation – ie low byte followed by high byte.

But since we will only be dealing with whole multiples of 256 bytes, the low byte will always start at zero. The high bytes (#81 and #83) therefore contain the initial page numbers of the blocks of memory being manipulated.

The other parameter necessary for some of the routines is stored at #88, and is the initial page number of the memory on which the routine is to act. This would normally be #80 since the active screen memory always starts at #8000, but sometimes you might want to manipulate a different part of memory and exchange it with the current screen memory.

Program 1

```

10 T=#80;F=#82;W=#84;H=#85;Q=#86;N=#87;B=#88;V=#89;K=#90
20 DIM LL37;FORJ=0TO37;LLJ=-1;N.
30 P.$21;FORJ=1TO2;P=#39B0;[
40 \
50 \COLOUR CHANGES ?Q=#FF or 55 or AA
60 \
70:LL0 JSRLL33;JSRLL36
80:LL1 LDA(T),Y;EORQ;STA(T),Y;DEY;BNELL1
90   INCT+1;DEX;BNELL1;RTS
100 \
110 \BLOCK EXCHANGES (SET F?1 & T?1)
120 \
130:LL2 LDY@0;STYF;STYT;JSRLL36
140:LL3 LDA(F),Y;PHA;LDA(T),Y;STA(F),Y;PLA;STA(T),Y
150   INY;BNELL3;INCF+1;INCT+1;DEX;BNELL3;RTS
160 \
170 \LOAD/STORE (SET T?1 & F?1)
180 \
190:LL4 LDY@0;STYF;STYT;JSRLL36
200:LL5 LDA(F),Y;STA(T),Y;INY;BNELL5
210   INCF+1;INCT+1;DEX;BNELL5;RTS
220 \
230 \ROTATE RIGHT
240 \
250:LL6 JSRLL33;LDAH;STAQ
260:LL7 LDYW;DEY;LDA(T),Y;PHA;DEY
270:LL8 LDA(T),Y;INY;STA(T),Y;DEY;DEY;BPLLL8
280   INY;PLA;STA(T),Y;JSRLL34;BNELL7;RTS
290 \
300 \ROTATE LEFT
310 \
320:LL9 JSRLL33;LDAH;STAQ
330:LL10 LDY@0;LDA(T),Y;PHA;INY
340:LL11 LDA(T),Y;DEY;STA(T),Y;INY;INY;TYA;CMPW;BNELL11
350   DEY;PLA;STA(T),Y;JSRLL34;BNELL10;RTS
360 \
370 \LATERAL INVERSION
380 \
390:LL12 JSRLL33;LDAH;STAQ;LDYW;DEY;STYV

```

```

400:LL13LDAV;LSRA;TAY
410:LL14LDA(T),Y;JSRLL15;TAX;TYA;EORV;TAY
420      LDA(T),Y;JSRLL15;PHA;TXA;STA(T),Y;TYA;EORV;TAY
430      PLA;STA(T),Y;DEY;BPLLL14
440      JSRLL34;BNELL13;RTS
450\COLOUR OR B & W?
460:LL15PHA;LDAN;BEQLL17;ASLA;ASLA;BMILL16\ COLOUR OR B&W?
470\INVERT A COLOUR BYTE
480      PLA;RORA;RORA;ROLK;ROLA;ROLK;RORA
490      RORA;RORA;ROLK;ROLA;ROLK;RORA
500      RORA;RORA;ROLK;ROLA;ROLK;RORA
510      RORA;RORA;ROLK;ROLA;ROLK;RORA;LDAK;RTS
520\INVERT A B&W BYTE
530:LL16PLA;RORA;ROLK;RORA;ROLK;RORA;ROLK
540      RORA;ROLK;RORA;ROLK;RORA;ROLK;RORA;ROLK;LDAK;RTS
550\IN ZERO MODE - IS IT A GRAPHICS CHARACTER?
560:LL17PLA;ROLA;BMILL18;RORA;RTS
570\IF SO INVERT IT
580:LL18RORA;RORA;ROLK;RORA;PHP;ASLA;ASLA;PLP;RORA;RORK;RORA
590      RORA;ROLK;RORA;PHP;ASLA;ASLA;PLP;RORA;RORK;RORA
600      RORA;ROLK;RORA;PHP;ASLA;ASLA;PLP;RORA;RORK;RORA
610      RORA;PHP;ASLA;PLP;RORA;RORA;PHP;ASLA;PLP;RORA;RTS
620\
630\UP DOWN INVERT
640\
650:LL19JSRLL33;LDA@0;SEC;SBCW;
      STAF;JSRLL36;DEX;STXQ
660      LDAB;CLC;ADCQ;STAF+1;
      LDAH;LSRA;STAQ
670:LL20LDYW;DEY
680:LL21LDA(T),Y;JSRLL23;TAX;LDA
      (F),Y;JSRLL23;STA(T),Y;TXA
      STA(F),Y;DEY;BPLLL21;
      LDAF;BNELL22;DECFT+1
700:LL22SEC;SBCW;STAF;JSRLL34;
      BNELL20;RTS
710\ZERO MODE?
720:LL23PHA;LDAN;BEQLL24;PLA;RTS
730\GRAPHICS CHARACTER?
740:LL24PLA;ROLA;BMILL25;RORA;RTS
750\INVERT CHARACTER
760:LL25RORA;PHA;AND@3;ASLA;ASLA;
      ASLA;ASLA;STAK
770      PLA;PHA;AND@48;LSRA;LSRA;
      LSRA;LSRA;STAK+1
780      PLA;AND@#CC;ORAK;
      ORAK+1;RTS

```

```

790\
800\ROTATE UPWARDS
810\
820:LL26JSRLL33;STAF+1;LDYW;STYF;DEY
830:LL27LDA(T),Y;STAK,Y;DEY;BPLLL27;INY
840      JSRLL36;JSRLL5;LDXW;DEX;DEY;DECT+1
850:LL28LDA K,X;STA(T),Y;DEY;DEX;BPLLL28;RTS
860\
870\ROTATE DOWNWARDS
880\
890:LL29JSRLL36;DEX;STXQ;LDAB;CLC;ADCQ
900      STAT+1;STAF+1;LDY@0;STYT;STYF;DEY;LDXW;DEX
910:LL30LDA(T),Y;STAK,X;DEY;DEX;BPLLL30;LDAW;STAT;JSRLL36
920:LL31LDA(F),Y;STA(T),Y;DEY;BNELL31
930      LDA(F),Y;STA(T),Y;DEY;DECFT+1;DECT+1;DEX;BNELL31
940      INCT+1;LDY@0;STYT;LDYW;DEY
950:LL32LDAK,Y;STA(T),Y;DEY;BPLLL32;RTS
960\
970\INITIALISE VARIABLES
980\
990:LL33LDAB;STAT+1;LDY@0;STYT;STYF;RTS
1000\
1010\MOVE DOWN TO NEXT LINE
1020\
1030:LL34LDAT;CLC;ADCW;STAT;BCCLL35;INCT+1
1040:LL35DECQ;RTS
1050\
1060\CALC. NO. OF BLOCKS
1070\
1080:LL36LDAW;ASLA;ASLA;STAV
1090      LDAH;LSRA;LSRA;LSRA;BITV;BMILL37;LSRA
1100:LL37TAX;RTS
1110];N.;P.$6
1120 @=1;P.$12"FOR ROUTINE... LINK.. =#"&LLO"+"
1130 P."COLOUR CHANGES      #"&LLO"  ",0'
1140 P."EXCHANGE VIEWS      #"&LL2"   ",(LL2-LLO)'
1150 P."LOAD/STORE VIEWS    #"&LL4"   ",(LL4-LLO)'
1160 P."ROTATE RIGHT        #"&LL6"   ",(LL6-LLO)'
1170 P."ROTATE LEFT         #"&LL9"   ",(LL9-LLO)'
1180 P."LEFT-RIGHT INVERT   #"&LL12"  ",(LL12-LLO)'
1190 P."UP-DOWN INVERT      #"&LL19"  ",(LL19-LLO)'
1200 P."ROTATE UPWARDS      #"&LL26"  ",(LL26-LLO)'
1210 P."ROTATE DOWNWARDS    #"&LL29"  ",(LL29-LLO)"
1220 P."ASSEMBLY ENDED AT    #"&P"    ",(P-LLO)"
1230 END

```

Table 3. Effects on different colours of EORing with different numbers

?#86= change (and vice versa)

#FF	colour 0 to colour 3
	colour 1 to colour 2
#AA	colour 0 to colour 2
	colour 1 to colour 3
#55	colour 0 to colour 1
	colour 2 to colour 3

An example of this is the animated graphics in the demonstration program where three different views of a train are shown on the screen in turn, each one being rotated to the left while in an area of memory not being displayed.

Having digested all this, let's look at the individual routines.

Colour changes: This routine simply goes through an area of memory doing an "exclusive OR" (a particular logical manipulation) on each byte with another parameter held in zero page (stored at #86). The three possible numbers to put at #86, and their effects, are shown in table 3.

Block exchanges: The size of the data blocks involved is first calculated (= ?#84 * ?#85 bytes) and the starting page numbers of each block have to be stored at #81 and #83.

Load/Store Data: This is set up in a similar way to the exchange routines, but here the contents of pages ?#81 and following are overwritten by the contents of pages ?#83 and following.

Rotations: Up, down, left, right. These four routines take ?#84 by ?#85 bytes of data, starting from page ?#88 and rotate them by one whole byte in the relevant direction.

Inversions: Lateral or up/down. These routines invert the view as specified by the same parameters used in the rotation routines, but they also have to check which mode of graphics is being used. The routines will be modified automatically according to whether the view is in colour or black and white, and if it is full graphics or, in zero mode, semi-graphics (pixels)/or text.

Program 2

```

10 T=#80;F=#82;N=#87;K=#91
20 B=#B000;?N=?B;F?6=T;A=#8000;H=#3FF
30 C=#39B0;E=C+21;S=C+51;R=C+75;L=C+108;M=C+143
40 I=C+321;U=C+429;D=C+469
50 DIMLL1,P-1;G=P;P.$21;[JSR#FFE3;STAK;RTS
60:LL0 LDA@T;STAT+1;LDA@T+4;STAT+3;JSRE;JSRL;JSRL;RTS
70:LL1 JSRLLO;LDAB+1;CMP@#FF;BEQL1;RTS;]
80 P=#55;Z=4;Y=64
90 P.$6;G.a
100mLI.G
110 IF?K=65 GOS.i;IN."START FROM PAGE"X;F?6=X;GOS.j
120 IF?K=67 G.x
130 IF?K=68 LI.D
140 IF?K=69 GOS.n;LI.E;G.m
150 IF?K=70 G.a
160 IF?K=71 G.g
170 IF?K=72 GOS.i;IN."HEIGHT"X;F?3=X;GOS.j;G.m
180 IF?K=73 LI.I
190 IF?K=76 LI.L
200 IF?K=77 LI.M
210 IF?K=80 G.c
220 IF?K=81 LI.G;T?6=(?K%3+1)*P;LI.C;G.m
230 IF?K=82 LI.R
240 IF?K=83 GOS.n;LI.S;G.m
250 IF?K=84 GOS.t;G.m
260 IF?K=85 LI.U
270 IF?K=87 GOS.i;IN."WIDTH"X;F?2=X;GOS.j;G.m
280 IF?K=88 FORJ=OTOH;A?J=J/Y%Z*P;N.
290 IF?K=89 FORJ=OTOH;A?J=J%Z*P;N.
300 IF?K=90 G.z
310 IF?K=100 DO LI.D;U.B?I=191
320 IF?K=108 DO LI.L;U.B?I=191
330 IF?K=114 DO LI.R;U.B?I=191
340 IF?K=115 G.s
350 IF?K=117 DO LI.U;U.B?I=191
360 G.m
370
380 CHANGE GRAPHICS MODE
390
400gLI.G;J=?K-48;IFJ<0ORJ>8 P.$7;G.g
410 J=32*J-16;IFJ<0 J=0
420 ?B=J;?N=J;G.m
430

```

```

440 INPUT PAGE NUMBER
450
460nGOS.0; IF J>-1 F?1=T+4*J;GOS.0;T?1=T+4*J;R.
470eGOS.i;IN."FROM"J;F?1=J;P.$30" "$30
480 IN."TO"J;T?1=J;GOS.j
490 IF T?1<#28 ORF?1<#28 P.$7;G.e
500 R.
510oLI.G;J=?K-49;IFJ<-1 OR J>5 P.$7;G.o
520 R.
530
540 MOVE IN & OUT OF ZERO MODE
550
560iFORJ=0TO25;K?J=A?J;N.;?B=0;P.$30;R.
570j?B=?N;FORJ=0TO25;A?J=K?J;N.;R.
80
590 DRAW A TRAIN
00
10tCOLOUR1;FORJ=0TO4;MOVE0,J;DRAW63,J;N.
20 COLOUR2;MOVE15,5;GOS.v;MOVE30,5;GOS.v
30 COLOUR3;FORJ=8TO16;MOVE13,J;DRAW37,J;N.
40 MOVE15,17;PLOT1,0,6;PLOT0,1,0;PLOT1,0,-6
50 FORJ=17TO24;MOVE28,J;DRAW37,J;N.
60 COLOUR1;FORJ=16TO20;MOVE31,J;PLOT1,3,0;N.;R.
70vPLOT1,3,0;PLOT0,1,1;PLOT1,-5,0;PLOT0,0,1;PLOT1,5,0;R.
0
0 SET HEIGHT & WIDTH OF GRAPHICS
0
0sJ=?B;?N=J;IFJ=0 F?2=32;F?3=16;G.m
0 IFJ<#50 F?2=16;F?3=64
0 IFJ=#70 F?2=16;F?3=96
0 IFJ=#B0 F?2=16;F?3=192
0 IFJ=#50 F?2=32;F?3=64
0 IFJ=#90 F?2=32;F?3=96
0 IFJ>#90 F?2=32;F?3=192
G.m
CLEAR DESIRED GRAPHICS MODE
xLI.G;J=?K-48;IFJ<0ORJ>8P.$7;G.x
X=(J+1)/2;CLEARX;IFJ%2 COLOUR0
?N=?B;G.m
850
860 SQUARES IN MOD
870
880zFORJ=0TOH;IFJ%
890 A?J=(J+X)%Z*P;I
900
910 ANIMATED TRAIN
920

```



Do you want control of text size in all graphic modes?

Do you want its side?
text written up-side down or on its side?

Do you want a user-defined character in several colours?

If so, read on.

TEXT VARIATIONS

Although the *User Guide* states that only in mode 7 can you have double height characters, there is a simple routine which allows an increase in text size for all graphic modes from normal until a single letter fills the screen. This is particularly useful if you want a larger text size with the highest resolution graphics in mode 0.

And it works equally well with user-defined characters and allows you to use all the colours available in the mode you are in to within one character.

The following Basic routine shows how (program 1). It uses the

function POINT to examine the letter to be magnified which is placed at TAB(0,0). This is converted to a graphics routine which draws the character in a larger size elsewhere on the screen.

This is sufficiently fast for headings and static displays but for a rapid display a short machine code programme is needed. In this the OSWORD call with A=9 should be used to examine the pixels that make up the printed character. The equivalent of the Basic PLOT routine for drawing the magnified characters by filling triangles is

entered via
VDU25,85;X;Y

Returning to program 1, insert line
125 Y%=-Y%

This will produce text upsidedown!
Now use

LIST 190,220

Use the copy facility to reverse the position of the X axis and Y axis in each statement. The text should now be written on its side from bottom to top. Simple routines thus allow any size of text to be placed in position on the screen.

A boon from abbreviations

Abbreviations can be a boon for loading, saving and running machine code programs. “*SAVE”, for example, shortens to “*S.” – though it must be followed by a filename and various addresses and so is not much of a saving.

Much more useful is knowing that “*LOAD” and “*RUN” can be shortened to “*L.” and “*R.”. And if you are using cassette files but do not want to specify the filename, there is no need to follow these commands with double quotation marks. In fact “*R.” can be abbreviated still further to “*/”.

The equivalent abbreviations for Basic programs are “LO.”, “SA.” and “CH.” which, since they have to be followed by a

filename, or at least double quotation marks, are hardly worth bothering with. Two other abbreviations worth knowing are “*E.” for “*EXEC”, and “*SP.” for “*SPOOL”, but both must have either a filename or a pair of quotes, except when “*SPOOL” is being used to close a spool file.

It is also handy to know that “*CAT” can be entered as “*.”. This is useful in its own right, but especially so when you realise it can be used as an equivalent of “*MOTOR1” to switch on the cassette rewind motor. The equivalent of “*MOTOR0” is then just ESCAPE, since this turns the motor off again.

Program 1

```

10 MODE 7
20 INPUT TAB(0.5) "What mode do you want?" r
30 IF NOT (r=0 OR r=1 OR r=2 OR r=4 OR r=5)
THEN PRINT "Not GRAPHICS MODE":GOTO20
40 MODEr
50 INPUT TAB(0.5) "How much bigger do you want
text?"n
60 P% = 0 : Q% = 900-32*n
70 CLS
80 REPEAT
90 VDU30
100 R$ = GET$ : PRINT R$
110 FOR H% = 991 TO 1023 STEP 4
120 Y% = H% -991
130 FOR G% = 1 TO 16 STEP 2
140 X% = G% : M% = 2
150 IF r = 1 OR r = 4 THEN X% = G%*2: M% = 4
160 IF r = 2 OR r = 4 THEN X% = G% *2: M% = 4
160 IF r = 2 OR r = 5 THEN X% = G%*4 :M% = 8
170 A= POINT (X%, H%)
180 GCOL 0,A
190 MOVE (P% + (X%*n), ((Y%*n)+Q%)
200 MOVE (P%+(X%*n)+(M%*n)),((Y%*n)+Q%)
210 PLOT85, (P%+(X%*n)),((Y%*n)+W%+4*n)
220 PLOT85,(P%+(X%*n)+(M%*n)),((Y%*n)+Q%+4*n)
230 NEXT G%
240 NEXT H%
250 P%=P%+X%*n
260 IF P%+X%*n>1280 THEN P% = 0:Q%=Q%-32*n
270 IF Q% > 1 THEN UNTIL FALSE
280 VDU31,0,31
290 FOR B% = 1 to n
300 VDU 10
310 NEXT B
320 Q% = Q% + 32*n
330 UNTIL FALSE

```

Notes

30 Checks value r is a valid graphics mode.
If not valid returns to Line 20

40 Enters graphics mode

50 n will be the multiplication factor

60 P% locates character on X axis, Q% on Y axis. Q% = 900 - 32*n ensures sufficient space above the starting point to draw the full height of the character

90 This is used to home cursor so that the next PRINT will place a character in TAB(0,0) - in Line 100

100 GET\$ holds the programme until you type a key. If you type more than one key they will be stored in sequence until the programme returns for them.

110-160 Will locate in turn each pixel that makes up the character

140-160 This depends on which mode you are in. X% and H% are the X axis and Y axis reference for each pixel

X% and Y% are the axis references for each pixel

where the bottom left pixel is X% = 1 and Y% = 1

170 A now becomes the foreground colour of the pixel being examined.

180 Use the same colour as found in line 170

190-220 This routine draws the magnified pixel starting at position P%, Q%. The position references X% and Y% from lines 120 and 140 are multiplied by the magnification factor n from line 50

230-240 Repeat this process for each pixel in the printed character

250 Calculate where the next enlarged character should start.

260 If there is not enough room to draw the next character start a new line: move down enough to fit the height of the magnified character

270 If this new line is on the screen go to line 80. REPEAT to repeat the whole sequence for the next character

280 Move cursor to bottom left corner to initiate screen scroll. (NB. The User Guide suggests VDU31 should use graphic X and Y values. My computer EPROM 0.1 responds to TAB values)

290-310 Scroll the screen until the next character will fit

320 Reset value of Q%

330 Go to line 80. REPEAT, to repeat the whole sequence for the next character



DUMB TERMINALS

by Paul Beverley

If you want to use the BBC microcomputer as a dumb terminal to link up to a mainframe computer, you will probably have seen R.C. Rand's program in the July issue of *Acorn User*.

It was intended for use with the 0.1 operating system and there are a number of FX/OSBYTE calls which make it easier to write a

dumb terminal program using the 1.0 system.

The program given below uses OSBYTE calls throughout and works when the Tube is fitted.

It uses the simplex mode - anything typed on the keyboard is not only sent down the RS423 but also echoed to the screen.

If you want it to work in the

duplex mode where the device with which you are communicating echoes all the characters sent to it, simply delete lines 240 and 250.

A choice of OSWRCH or OSASCI at lines 180 and 250 determines whether a linefeed character is generated with each carriage return.

Program

```

10 REM Dumb Terminal Program
20 REM P.E.Beverley 6/8/82
30 REM Only works on O.S. 1.0
40 REM Works even if Tube fitted.
50 OSASCI=&FFE3
60 OSBYTE=&FFF4
70 OSWRCH=&FFEE
80 DIM CODE 50
90 FOR J=0 TO 2 STEP2
100 P%=CODE
110 [OPT J
120 .RS423
130 LDA #&91
140 LDX #1
150 JSR OSBYTE\character in RS423 buffer?
160 BCS keyboard
170 TYA
180 JSR OSWRCH\or OSASCI for CRLF
190 .keyboard
200 LDA #&91
210 LDX #0
220 JSR OSBYTE\character in keyboard buffer?
230 BCS RS423
240 TYA
250 JSR OSWRCH\or OSASCI for CRLF
260 LDA #&8A
270 LDX #2
280 JSR OSBYTE\Put character in RS423 output buffer
290 JMP RS423
300 ]
310 NEXT
320 *FX 7,7
330 *FX 8,7
340 *FX 2,1
350 CLS
360 CALL CODE

```

OFF RECORDS...

The London ACORN
-BBC Centre Suppliers to schools and Colleges

OFFWARE NEW!

The new range of programs and routines backed by the OFF Records reputation!

UTILITY DISC for the ATOM

Contains no less than seven disc utility routines:

- *Copy.....(disc to disc)
- *COPYT.....(tape to disc)
- *CopyD.....(disc to tape)
- *RENAME
- *PURGE
- *BACKUP
- *AUTORUN

£25.00 p.p. \$ VAT incl.

BBC GAMES with superb graphics:

- FRUITWORM (Model A)
- FRUIT (Model A)
- JAMCAR (Model A - 32K)
- Labyrinth (Model A - 32K)

each **£9.00** p.p. & VAT inclusive

**Computer House, 58 Battersea Rise,
Clapham Junction, London SW11 1HH.
Telephone: 01-223 7730**

Atom:

Full hardware and software support

BBC:

Models A and B at £229 and £399.
Repair Service for all machines supplied by
Acorn or OFF Records. Software now in stock.
Memory up-grades £26.99

Printers:

Seikosha 100: £215
Epson MX80FT/3: £385
Smith Corona Daisywheel (not a
converted typewriter!): £485

Cassettes:

BBC-matched cassette recorders: £32

Monitors:

12" 18MHz green screen monochrome: £110
14" colour £325

14" Sanyo PAL colour TV. Superb value: £235

Tapes:

Top Tape: See adverts in Radio Times.
OFF Records beats all published prices!

Stationery:

Continuous: Labels, Listing Paper, Word
Processing Paper, Invoice/Statement

Books:

Large selection of computer books and mags.

Also:

TORCH, NASCOM, GEMINI, GALAXY,
QUANTUM, DRAGON, MICROPROFESSOR



ACORN PLUS

FREE!
NEW 100 PAGE
CATALOGUE
FREE!

Control Universal stock Acorn, Rockwell, Cubit and fine peripherals. Send for our catalogue.

ACORN STOCK

Ring Control Universal on four telephone lines for technical advice and fast deliveries on all Acorn products - Eurocards, systems, Atoms, all software, networks components, connectors, spares - everything you need.

MORE STOCK

Control Universal also stock Rockwell Computers, EPSON and TEC printers, BMC and MICRIVITEC vdu displays, G.P.I. EPROM programmers and erasers, disks, stationery, memory and TTL chips.

CUBIT

The CUBIT range is made by Control Universal and includes single board computers with 4K RAM and VIA i/o chip for 6502, 6802 and 6809 processors; CU-MEM memory card for eight 24 or 28 pin memory chips, with on board battery back up for CMOS RAM; CUBIO 64/80 channel digital i/o card; CUBAN eight bit analogue interface with 16 analog inputs, one analog output and 20 digital i/o channels; CU-KEY ascii keyboard.

'ATOM PLUS 17K RAM - £69 why 17k ?

- to fill in the gap from hex 3CO0 to 3FFF with 1K of static RAM, and provide 16k of dynamic RAM from 3000 to 10FFF. Uses 5v only devices, and fits in the standard Atom case.

Standard Eurocard size and bus connector.

'CU-DRAM' 64K bytes DRAM - £129

For all Acorn and Control Universal systems. Each block of 4k can be enabled or disabled to match the system. Carries also a 4k/8k 28 pin socket for ROM or EPROM, and can be software selected at board level to allow up to 16 boards in one system and hence a maximum of 1Mbyte of RAM.

Standard Eurocard size and bus connector.

CONTROL UNIVERSAL LTD.

Unit 2, Andersons Court, Newnham Road, Cambridge
(0223) 358757

**VISIT OUR
NEW SHOWROOM**

FIREWORKS

JOE TELFORD LIGHTS UP
THIS NOVEMBER ISSUE
WITH A LISTING TO
PRODUCE A
CATHERINE WHEEL
THIS IS WELL-REM'D
AND ILLUSTRATES
HIS HINTS AND TIPS
ARTICLE
THE WHEEL CAN
SPEED UP OR SLOW
DOWWN, SO TYPE IT IN
LIGHT PAPER - OR PRESS
ANY KEY - AND
STAND WELL CLEAR!

```

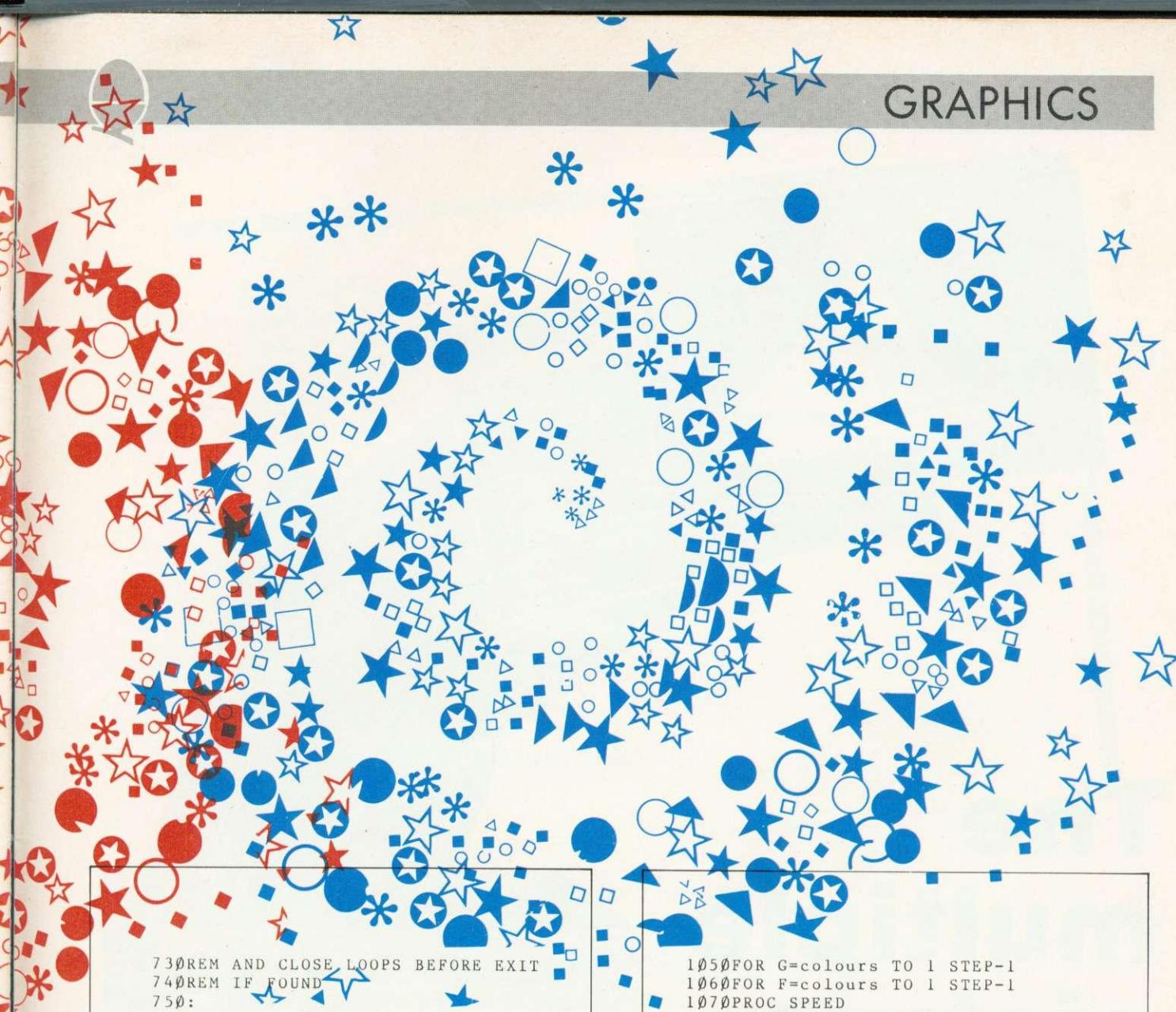
LOAD"8SPRL"
>L.
100REM CATHERINE WHEEL
110REM J.TELFORD.
120:
130ON ERROR GOTO1300
140MODE7
150mode=5
160colours=3
170:
180REM CHECK FOR MODEL A
190:
200IF HIMEM = 31744 THEN mode=2:colou
rs=7
210:
220REM USE BEST MODE+COLOURS
230:
240MODE mode
250:
260REM SET UP SPEED,RADIUS,
270REM CURVE FACTOR AND
280REM INITIAL ANGLE OF TURN
290:
300S%=200
310R=896
320CF=10
330turn=0
340:
350REM TURN OFF CURSOR
360:
370VDU23;8202;0;0;0;
380:
390REMEMBER TO CENTRE THE ORIGIN
400REM ON THE SCREEN.

```

```

410:
420VDU29,640;512;
430:
440REM MOVE TO START OF CURVE
450REM WITHOUT UGLY LINES
460:
470MOVE R*COS turn,R*SIN turn
480:
490REM WE NEED 351 SEGMENTS
500:
510FOR C% = 0 TO 351
520:
530REM CHANGE COLS FOR EACH SEGMENT
540:
550GCOL0,C% MOD colours+1
560DRAWR*COS turn,R*SIN turn
570DRAW(R-50)*COSTURN,(R-50)*SINTURN
580turn=turn+PI/CF:R=R-CF/4
590PLOT85,R*COS turn,R*SIN turn
600PLOT85,(R-50)*COS turn,(R-50)*SIN
turn
610NEXT:REM SPIRAL DONE NOW
620REM PRESS ANY KEY TO SPIN WHEEL
630:
640a$=GETS
650FOR G= 1 TO colours
660FOR F=1 TO colours
670:
680REM CHECK FOR SPEED UP OR DOWN
690:
700PROC_SPEED
710:
720REM CHECK FOR REVERSE DIRECTION

```



```

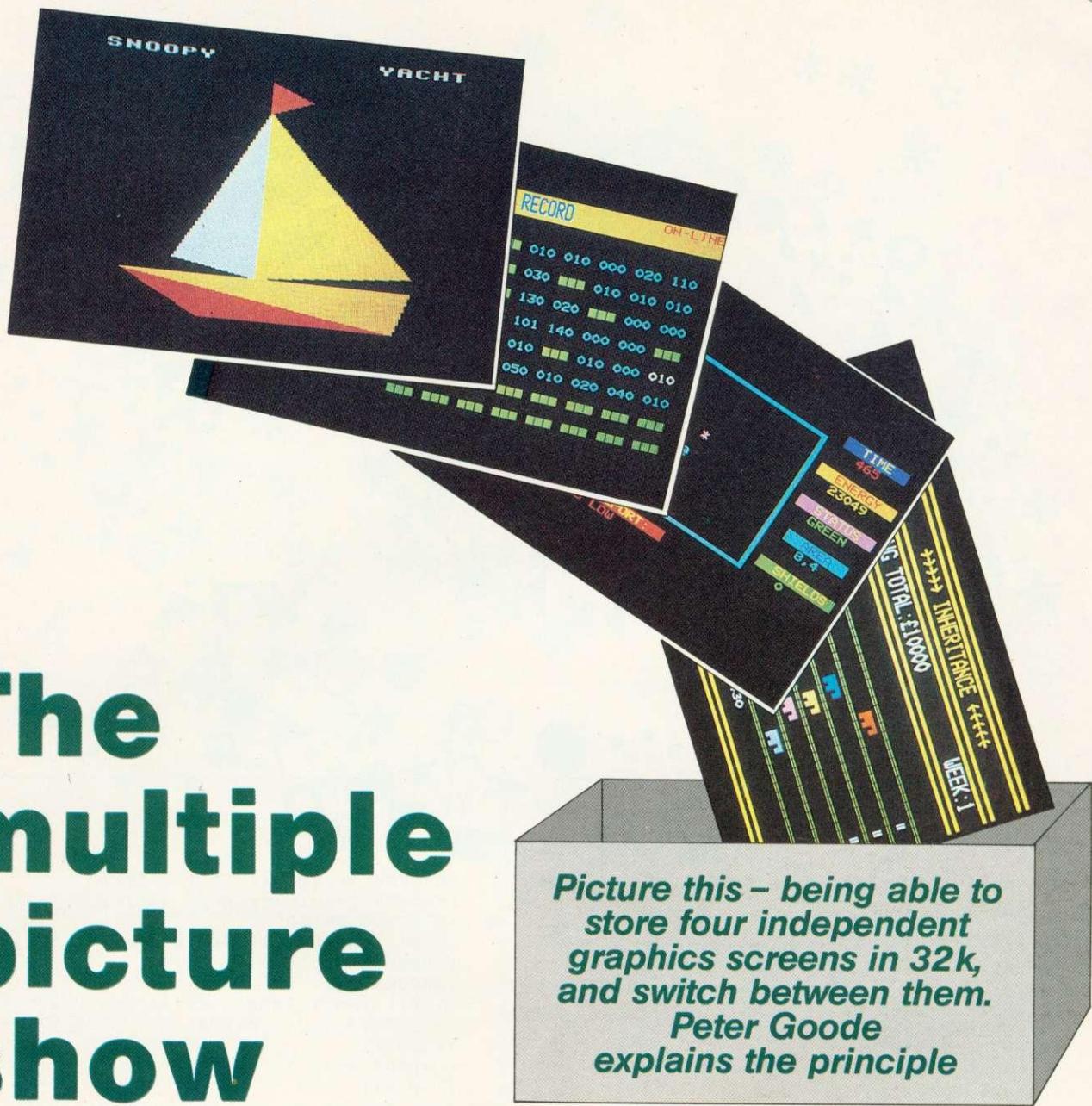
730REM AND CLOSE LOOPS BEFORE EXIT
740REM IF FOUND
750:
760IF speed$="R" THEN G=colours:F=G:G
0TO890
770:
780REM H MUST BE GREATER THAN 0
790REM TO KEEP COLOURS RUNNING
800:
810H=F
820GCOL0,F
830IF F-G<1 THEN H=F+colours
840:
850REM CHANGE EACH LOGICAL COLOUR
860REM CONSECUTIVELY
870:
880VDU19,F,H-G,0,0,0
890NEXT
900:
910REM DELAY FOR EFFECT REQUIRED.
920:
930FOR WT=1 TO S%:NEXT
940NEXT
950REM IF NO REVERSE KEEP SPINNING
960IF speed$<>"R"THEN650
970:
980REM REVERSE SPIN
990REM LINES 610 TO 730
1000REM PREFORM AS 380 TO 590
1010REM BUT COLOURS 'MOVE'
1020REM IN OPP. DIRECTION.
1030REM HENCE NOT REMed.
1040:

```

```

1050FOR G=colours TO 1 STEP-1
1060FOR F=colours TO 1 STEP-1
1070PROC SPEED
1080IF speed$="R"THEN G=1:F=1:GOTO1130
1090H=F
1100GCOL0,F
1110IF F-G<1 THEN H=F+colours
1120VDU19,F,H-G,0,0,0
1130NEXT
1140FOR WT=1 TO S%:NEXT
1150NEXT
1160 REM IF NO REVERSE KEEP SPINNING
1170IF speed$<>"R"THEN1050
1180REM REVERSE SPIN
1190GOTO650
1200DEFPROC SPEED
1210speed$=INKEY$(0)
1220IF speed$>AND S%>0 THEN S%-S%-10
1230IF speed$<<AND S%<400THEN S%-S%+10
1240IF speed$=""THEN S%=200
1250ENDPROC
1260:
1270REM MODE 7 TO RESET RANDOMISED
1280REM COLOURS, AND READABLE TEXT.
1290:
1300MODE7:REPORT:PRINT" at line ";ERL
1310END
1320REM USE KEYS.....
1330REM > TO SPEED UP.
1340REM < TO SLOW DOWN.
1350REM = TO RESET SPEED.
1360REM R TO REVERSE SPIN.
1370REM HOLD R DOWN TO FREEZE WHEEL
>

```



Picture this – being able to store four independent graphics screens in 32k, and switch between them.

**Peter Goode
explains the principle**

The multiple picture show

Imagine the advantage of being able to switch instantly from one picture to another on your BBC microcomputer.

Many games require a complex, high-resolution playing field, for instance, and drawing one takes an annoyingly long time – even with the BBC machine's fast graphics.

How pleasant, then, for your program to be able to draw a complex maze while you are busy reading – or understanding the instructions for the game. And it is possible, on both model A and B machines, for two effectively independent screens to exist side by side, and for the program to choose which one the user can see.

No incomprehensible machine

code or peek and poke routines are necessary. Standard graphics commands can be adapted to provide complete control over two screens, or up to four on the model B machine.

First let me explain how the BBC computer stores graphics information.

In mode 5, the only mode which can provide two screens on the model A, each of the screen's 40960 dots can be assigned one of four colours.

Table 1. Binary code for colours

A	B
0	0
0	1
1	0
1	1

0 = Colour 0, default black
0 = Colour 1, default red
1 = Colour 2, default yellow
1 = Colour 3, default white

Two binary bits per dot are needed to store this much information.

Each of these bits can be either 0 or 1, and only two are necessary to give one of four colours.

The binary numbers to represent the four colours are shown in table 1. The two bits have been assigned arbitrary labels, A and B.

If we choose colour 1 as 'screen 1 foreground colour' and colour 2 as 'screen 2 foreground colour', ignoring bit A allows us to draw in colour 1 on a background of colour 0. We can ignore bit A quite simply by executing the command:

VDU 19,2,0,0,0,

This tells the computer to set colour 2 to black, ie the background

```

1000 DEFPROSCREENONE
1010 VDU 19,3,C1,0,0,0:VDU 19,2,C0,0,0,0:VDU 19,1,C1,0,0,0
1020 S=1:PROC PLOT
1030 ENDPROC

1040 DEFPROSCREENTWO
1050 VDU 19,3,C2,0,0,0:VDU 19,1,C0,0,0,0:VDU 19,2,C2,0,0,0
1060 S=2:PROC PLOT
1070 ENDPROC

1080 DEFPROC PLOT
1090 GCOL 1,S
1100 ENDPROC

1110 DEFPROC ERASE
1120 GCOL 2,3-S
1130 ENDPROC

1140 DEFPROC INIT
1150 MODE 5
1200 C0=0:C1=7:C2=3
1210 PROCSCREENONE:PROC PLOT
1220 ENDPROC

```

colour, thus making all lines previously drawn in colour 2 invisible. The command:

VDU 19,1,0,0,0,

followed by

VDU 19,2,3,0,0,0

will blank out lines drawn in colour 1 and restore those drawn in colour 2 to their original colour (yellow). Colour 2, of course, can be set to any colour desired.

To go into further detail would probably confuse. Nothing beats hands-on experience with computers so here are some working routines and examples. All require the procedures shown in program 1, so type them in before advancing any further.

The procedures perform the following tasks:

- PROCSCREENONE will display screen one and enable plotting on screen one.
- PROCSCREENTWO will perform the same task but for screen two.
- PROC PLOT will turn on plotting on the screen selected by S.
- PROC ERASE will turn on erasing on the screen selected by S.
- PROC INIT switches to mode 5, screen one and enables plotting on that screen.

Try the following:

PROC INIT

The computer will switch to mode 5 graphics and text. You can now draw on screen one. Try entering:

```

MOVE 0,0
MOVE 1000,1000
PLOT 85,1000,0

```

This will cause the computer to draw and fill a triangle, in white.

PROCSCREENTWO

'No machine code or peek and poke routine necessary'

The triangle has vanished.

```

PROC PLOT
MOVE 0,0
MOVE 0,1000
PLOT 85,1000,0

```

A new triangle has appeared.

PROCSCREENONE

the old one appears again,

PROCSCREENTWO

the new one again.

The background and two foreground colours can be set to any colour (0-15) at any time by changing the values of C0, C1 and C2. For example, try:

```

C0=1
C1=11
PROCSCREENONE

```

The first triangle re-appears but in flashing yellow and blue on a red background.

The screen one and screen two procedures work well for this, but if we want to draw on the invisible screen, and not the one the user can see, we simply use

```

S=1
PROC PLOT

```

to draw on screen one, and

```

S=2
PROC PLOT

```

to draw on screen two.

Erasing can also be done in this way using PROC ERASE instead of PROC PLOT. For example:

```

PROCSCREENONE: S=2:PROC PLOT
MOVE 0,0:MOVE 1000,1000:
PLOT 85,0,1000
PROCSCREENTWO:REM make it
visible.

```

If you are lucky enough to have 32k of RAM try adapting the procedures to create two screens of four colours or four of two.

Beeb link to second micro

Sir, Is it possible to link my ITT computer up to a BBC micro via the RS232 interface, and will the Tube or 1MHz extension bus allow this?

I am also using a disc and printer with my ITT system.

Mr J. Hughes
Liverpool

The BBC micro has an RS423 interface which is compatible with RS232C equipment, and will transmit over greater distances. The RS423 allows you to transmit or receive serial data, ie, to act as a dumb terminal with a larger computer transferring serial ASCII data. It also allows you to use a serial RS232C type printer.

The information the micro gives is as follows:

1 START BIT
8 BITS OF DATA
1 STOP BIT
NO PARITY

Some printers require either even or odd parity, therefore they will not work with the micro, however, there

may be internal links which will give the printer the above format.

With the 0.1 machine operating system the micro will not receive serial data from another micro, using the simple *FX commands, but it will transmit. (See July Acorn User for which will allow the user to receive this information).

The version 1.0 will allow you to transmit and receive using the single FX commands which are available.

Serial data will consist of ASCII code which can be placed in either machine's RAM, therefore programs will only run on one of the machines because the basic and memory maps will be different.

The Tube will be a high speed data link from a second processor to the BBC micro. It probably won't allow you to connect another computer to this, but fuller details will be available shortly.

The 1MHz extension bus will allow you to connect Acorn's euro-cards to the micro. It will then be possible to add extra RAM cards to the micro without having to purchase a second processor.

Atom packs up on Basic

Sir, About 18 months ago I purchased an Atom micro, which after about three months of disuse refused to enter Basic on power up.

The display was a seemingly random collection of characters, and repeated depression of break did not produce a reset, neither did powering down and up repeatedly.

Examination of the break circuit shows no abnormality, and the PSU shows no unusual fluctuations. I have not tried directly manipulating the 6502 reset line (mainly as I'm not sure which pin carries it!).

Mr S. Calsy
Herts

Your machine will have to be returned to Acorn's service department, as with problems like this quite a bit of circuitry is used.

The actual break key could be at fault, the 8255 I/O chip could be at fault, ie, not accepting input from break key, or giving an incorrect clock frequency for 6502 (1MHz). If readers have any problems with

their Acorn micros, the first port of call is the local dealer (see page 72).

Retail control systems take care of faults dealers cannot handle. The address is Gresham House, Twickenham, Road, Feltham, Middlesex TW13 6HA. If you need advice telephone TCS on 01-898 4761.



User group news - page 48



Computer theft

in the night

Sir, Could you find room to tell readers that my BBC model B microcomputer, serial number ICL 006847 has been stolen. It disappeared during the night along with other goods when thieves broke into my home.

If anyone knows of its whereabouts, would they contact their local police, or let me know through the magazine.

To lose the computer when I had only had it four weeks is most upsetting. I was just beginning to enjoy it.

Roger Bishop
Kent

String errors

Sir, I have a program that inputs 10 series of 10 strings, 10 integer variables and ten floating point variables.

However, when the computer reads the data, it misses something in the sixth series, seventh string and gives an error message.

String number seven then contains peculiar things. How can I stop this happening?

Mogens Johannsen
Denmark

Entering the following few lines at the beginning of your program should make it work.

- 5 !&70 = &F5212048
- 6 !&74 = \$6068
- 7 ?%218 = 0
- 8 ?&219 = &70

Hot stuff

Sir, I have a model B BBC micro which gets hot from the power supply. Will this affect my micro, and will the power supply allow for the addition of a disc unit?

D. Hill

Birmingham

Sir, After running my BBC model B, which I have had for about a week, for several hours it began to give off the smell of warmed plastic. These fumes were obviously caused by the heat of the power supply unit, and the computer's ventilation holes were not obstructed in any way.

What I would like to know is whether this is just a temporary problem because of the newness of the machine, or if not, what can be done.

Mr D. Short

Cheshire

The linear power supply by its very nature gets hot, but this should not effect the running of your machine.

If it gives off fumes, there must

be something wrong with the machine and it should be returned to your nearest dealer for checking.

When the micro is upgraded to take a disc interface at an approved service centre, the power supply unit is changed free of charge to a switched mode unit at the same time.

Pascal ROM

Sir, Is the Pascal ROM available yet? How much is the ROM, which dialect will it be?

Certain dealers have offered a model A with a 32k RAM. Am I right in believing that this computer will carry out any of the graphics and any other capabilities (other than the bus etc)? Would this run Pascal?

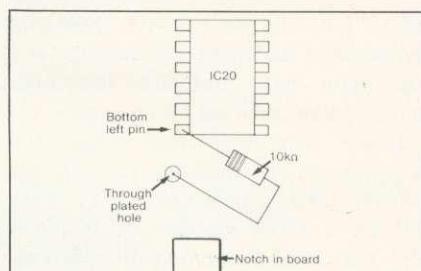
Mr C. Smith

Kent

We have no details on Pascal at present, but Acorn will be releasing a version probably in ROM. The exact date is not known, but it should be in spring next year. The

cost has yet to be fixed.

With the additional RAM you will be able to obtain the extra graphics modes 0-3.



Buzz off

Readers who are fed up with a buzzing BBC micro can solve the irritation by connecting a 10kΩ resistor to IC20 as shown above. This chip is found on the main board near the front of the micro under the keyboard.

This alteration is only recommended for people who are used to working with electronics, as it will invalidate Acorn's guarantee. Dealers can also make this change.



WHAT PEOPLE ARE SAYING ABOUT OUR . . .

BBC MICRO GAMES

... I bought all your tapes to date for the BBC Micro and I think they are just super, especially STAR TREK, and the sound effects in CANDY FLOSS really made me sit up! Well done and keep them coming".

J. S., Paisley

... I was very impressed, not only with the cassette, but also at the speed at which it came!"

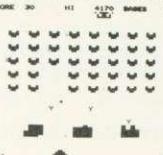
— R.L., Cheshire

... I must congratulate you on your MUTANT INVASION cassette. I have had it for two weeks now and it is really superb. Incidentally, I have beaten your high score of 4,500 — mine is 7,580!"

— S.L., Berks

AND NOW LOOK AT OUR LATEST CASSETTES!

CASSETTE EIGHT Model A Invaders



Actual screen photo

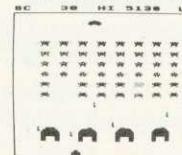
Cassette Eight contains Model A Invaders. A superb full feature machine code teletext colour graphics version of the popular 'Space Invaders' arcade game for the Model A BBC Micro. Choice of Invader and Missile speeds. FAST, SMOOTH AND GREAT FUN!

Only £4.95 inc.

CASSETTE TEN: WORDPRO. Cassette based word processor for either Epson or Seikosha printers. Features right hand justification, alter, insert, delete, save pages to tape, printer mode changes from within text line etc. etc. Complete with manual.

Only £9.95 inc. (Model B or A + 32K)

CASSETTE NINE Model B Invaders



Actual screen photo

Cassette Nine contains Model B Invaders. A superb full feature adaptation of the arcade 'Space Invaders' game in machine code and high resolution colour graphics for the BBC micro model B (or A + 32K). Play normal game or choose from the many options including Missile, Bomb and Invader speeds, Invisible/Visible Invaders and Shields/no Shields. Quite simply the best!

Only £6.95 inc.

NOT FORGETTING THE REST OF OUR FANTASTIC RANGE

FOR MODELS A AND B

Cassette One: STAR TREK (8x8 Galaxy, Klingons, Phasers etc) and CANDY FLOSS, the tremendous new game everyone is talking about! Only £5.95 inc.

Cassette Two: HANGMAN, KRYPTOGRAM, DICE, BEETLE, GRAND NATIONAL and MUSIC. Only £3.95 inc.

Cassette Three: MUTANT INVADERS (arcade game). Can you destroy the Mutants before they destroy you with their radioactivity. Only £5.95 inc.

Cassette Four: BREAKOUT (arcade game). Superb version, 6 skill levels, 1 or 2 players. Only £3.95 inc.

FOR MODEL B ONLY (OR A + 32K)

Cassette Five: BEEBMUNCH (arcade game). Our version of the 'Pacman' game. Tremendous version containing multi-ghosts, tempting fruits, superpoints, screams etc. Only £5.95 inc.

Cassette Six: SUPER HANGMAN. The special feature is the high-resolution animated man. Marvel at the detail of his clothing and witness his impatience! Contains many categories. Only £3.95 inc.

Cassette Seven: 3D MAZE. Battle against the clock to escape from the maze, with the computer showing your view in 3-D each step you take! Only £3.95 inc.

ALL CASSETTES AVAILABLE NOW FROM:

(All our software is available before we advertise)

I. J. K. Software

55 Fitzroy Road, Bispham, Blackpool, Lancs

Run **BBC** type **BASIC** on your **ATOM**

then switch back to **ATOM BASIC**

Available now from Acornsoft, a 20k BBC ROM conversion module which can be added inside an Atom. It will support the full set of BBC - type BASIC commands. The BASIC syntax is identical so all programs that don't rely on the BBC hardware can be run on the Atom without any modification.

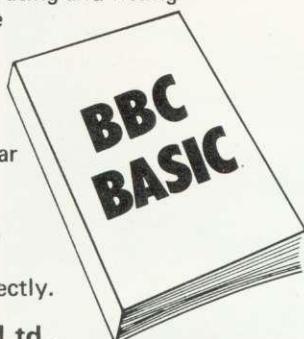
The module is fitted in parallel with Atom BASIC and may be selected by a switch or from the keyboard if certain modifications are made. It consists of 16k BASIC ROM, 4k operating system ROM and an additional 2k RAM that can be used by the Atom as well.

Complete with manual

A comprehensive BBC - type BASIC manual is supplied with every set giving full operating and fitting instructions, alternatively the module can be fitted by your dealer.

The price is £49.95 including VAT.

If you don't have a dealer near you just write to us with a cheque at the address below, or credit card holders can ring Cambridge (0223) 316039 and order directly.



Dept AU4, Acornsoft Ltd.,
4a Market Hill, CAMBRIDGE CB2 3NJ

ACORN **SOFT**



Windsor Computer Centre
For Acorn/BBC in Berkshire

On display in our Showroom:-

- * BBC Model A & B
- * Acorn Atom
- * Tandy Microcomputers
- * L.S.I. System M3

In Stock:-

- * Acornsoft software for BBC & Atom
- * Eduquest software for BBC
- * Books & Games
- * BBC Model A & B
- * Acorn GP80 Printers
- * Epson & Tandy Printers
- * Colour Monitors
- * Green screen Monitors
- * Cassette Recorders
- * Acorn Atoms at special prices
- * BBC Disk Drives
- * BBC Upgrade kits
- * Call us now for prices & advice

Open Weekdays 9.30am-6pm Saturday 10am-5pm
1 Thames Avenue, Windsor, Tel: Windsor 58077 (4 lines)

Electronequip

(Authorised BBC Dealer and service centre)

DRAGON

DRG1	Dragon 32K Micro	196.50
DRG50	Sekosa GP100A Printer for Dragon	228.75
DRG60	Joysticks for Dragon	19.95
DRG1xx	Cartridges for Dragon	19.95
DRG1xx	Cassettes for Dragon	7.82

ATOM

ATM2	Atom assembled 12Kram	184.00
ATM11	Atom Kit 12Kram	149.50
ATM22	Atom 4K Floating Point ROM	23.00
ATM26	New Atom 1.8A Power Supply	9.66
ATM41	5.25" Disc Drive for Atom(100K)	335.50

BBC

BBC1	BBC Micro Model A	299.00
BBC2	BBC Micro Model B	399.00
BBC3	BBC Model A Micro with 32K	338.30

BBC4	BBC Model A Micro 32K & VIA	345.00
BBC21	Upgrade Model A to B	115.00
BBC27	Disc Upgrade for BBC B	92.00
BBC30	14" Colour Monitor for BBC	287.50
BBC31	BMC 14" Colour Monitor	258.75
BBC33	BMC12A 12" Black/Green Monitor	90.85
BBC34	Karga 12" Black/Green Monitor	113.85
BBC35	Karga 12" Black/Ambre Monitor	113.85
BBC40	Cassette Recorder for BBC	29.90
BBC41	Single 5.25" Disc Drive 100K	265.00
BBC42	Single 5.25" Disc Drive 200K	328.90
BBC49	5.25" Discs for BBC 40/80 tracks	2.20
BBC50	Epson MX80T type 3 for BBC	373.75
BBC51	Epson MX80F/T type 3 for BBC	396.75
BBC70	Plinth/Stowage for BBC	29.90
BBC80	Cassette lead for BBC	4.60
BBC95	Printer lead for BBC	17.25

Large stocks. Prices inclusive of VAT

All prices inclusive of postage except micros 3.00

All upgrades etc. are fitted free of charge and the computer fully retested.

Credit cards not accepted for BBC micro's.

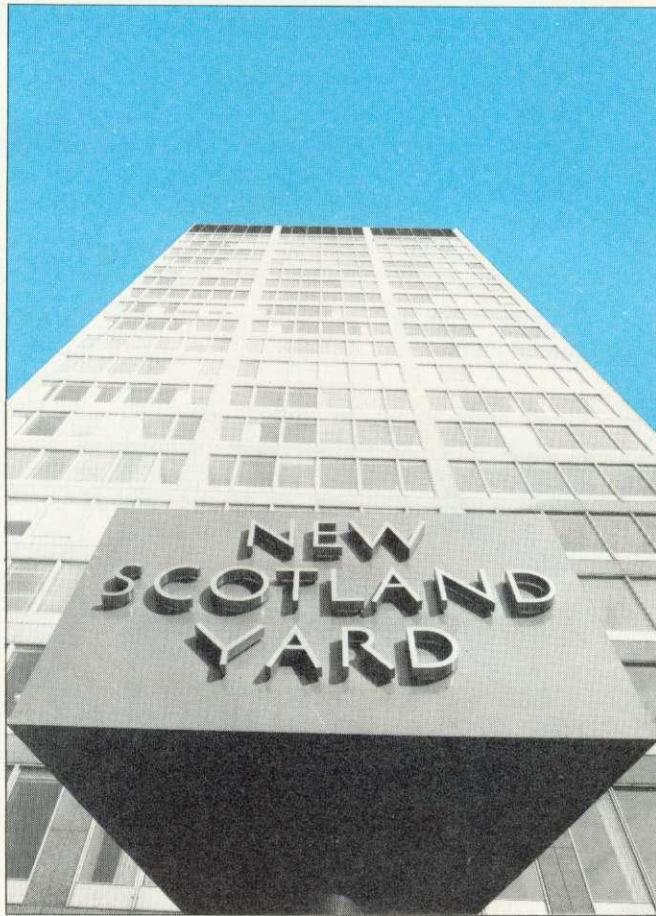


ACORN
COMPUTER

Electronequip

BBC

128 West Street, Portchester (A27 opp. RUBY) Hants PO16 9XE Tel: 0705-325354



ELECTRONIC ARMS

Simon Dally experiences first-hand how computers help the long arm of the law reach further and faster to beat crime

Last month we looked at the growth area of computer crime. But the computer also has proved more than a match for many criminals and is now in the forefront of today's fight against crime.

The most common felonies involve motor vehicles: stolen cars, drunken driving, speeding, bald tyres and so on. Most vehicle information is stored on the infamous Swansea computer, run by the Department of the Environment.

In spite of the widespread criticism it attracted when first installed in the early 1970s – it cost several times the original estimate and the delays were appalling – it now seems to function very

efficiently at least in one respect as I recently discovered.

One night as I was driving over Battersea Bridge I passed a police car and was waved down by a second on the other side. I was astonished to be greeted by the police officer in his 'just a routine check, sir' voice by my own name!

In the course of the 30 seconds it had taken to cross the bridge, my car number had been radioed to the computer and the details had been radioed back! Well, that's my story and I'm sticking to it...

From the police point of view, the most impressive technological advance in recent years has been the computerisation of the National Fingerprint Collection at New

Scotland Yard.

Six years ago the system was entirely manual. The collection comprised more than 2½ million prints, being added to at the rate of 200,000 a year and dealing with about 2000 inquiries a day from around the country.

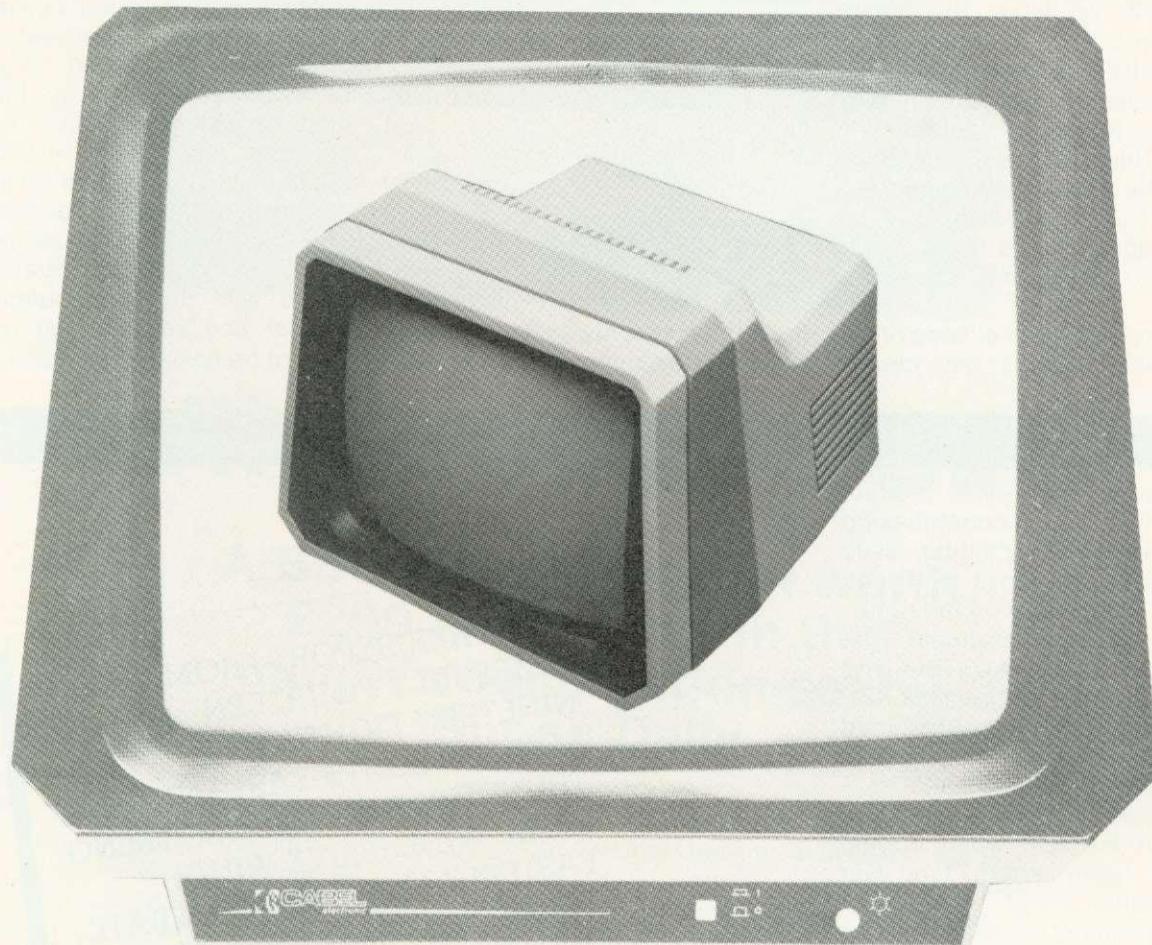
Since the average inquiry entailed making comparisons with 50 other prints – all stored on paper – the clerical effort involved was immense. Moreover, the prints could be consulted only by one officer at a time and the possibility of filing errors was all too likely.

The system the police have now adopted is Videofile and comes

page 70 ►



MC 370M R.G.B. COLOUR MONITOR



Cabel offers you a high quality 14 inch colour monitor

This monitor will clearly display 80 x 25 characters, unlike most of our competitors'. The MC 370M has been designed, using the highest quality materials and the most sophisticated components available on the market today, ensuring long service and reliability with high technology.

Our "2 Year Guarantee" includes parts and labour, proving our faith in our products, which have been widely used on the manufacturing markets for the past 10 years. **Price £289.00 including VAT and delivery.**

Special offer this month, Free R.G.B. Lead.

CHEQUE / POSTAL ORDER, OR FOR FAST DELIVERY, RING US WITH YOUR CREDIT CARD NUMBER



Mount Road, Burntwood, England, WS7 0AX
Telephone: 021-308 7075 Telex: 339671

► from page 67

from California. In essence it combines video techniques with sophisticated computer process control.

The computer stores the information in a digital database and keeps track of where each set of prints is on tape. The visual display uses a split-screen which magnifies the picture many times, and provides a resolution more than twice that of a standard TV screen. This enables suspects' prints to be shown simultaneously with the possible matching sets, enabling comparisons to be made quickly and by several officers at once.

The computerisation of fingerprints and criminal records has clearly

'Computerisation is, however no panacea'

saved a vast amount in terms of manpower and physical space. It is, however, no panacea - as the mounting crime figures and relatively low detection rates testify.

But the police are understandably reticent when it comes to discussing their use of computers. Every few months a story seems to break in the popular press of a breach of security in their system which gives an unauthorized person

access to confidential information. The press likes to imagine sinister computers 'chatting' to each other.

On the other hand, the press put up a tremendous howl about police incompetence during the hunt for the Yorkshire Ripper - and after his capture. But while the police have since conceded the investigations did become bogged down in paperwork, they point out that they tried to use the police national computer and found it too difficult to put all the information on to it.

And there are the real and more worrying fears of what the security services and Special Branch get up to with their computers. This familiar and very serious problem will not be easily resolved.

SEPTEMBER QUIZ RESULTS

We received over 150 correct entries for our codebreaking competition in the September issue. The solutions, for those who tried and failed, are printed on the right.

In the second example, the keyword was 'JANE AUSTEN' and the text was from 1 Corinthians XIII.

We apologise for the widespread gremlin who slipped in a misprint and inserted two wrong spaces - this didn't seem to put any of you off and in the real world coding operators make errors too! Our thanks to Brian Gill of Oldham for a most entertaining discourse on the nature of *Gremlinus Substituens*.

The winners, chosen at random, were

Anna Rose Surguy of Reading, Berks

Dave Woolcock of Preston, Lancs

Peter Gordon of Currie, Lothian

They all win £20-worth of programs for the BBC micro from Acornsoft.

To those snivelling wretches who complained about the competition being too easy, please bear in mind that we have to try to strike a balance for our readers, many of whom are totally new to microcomputers and have relatively modest mathematical abilities: we aren't trying to run the house journal of Mensa.

However, please stay with us: we are planning 'something' which should silence all your carping noises for a while!

WEATHER REPORT FROM THE
TIMES JULY FOURTEEN
NINETEEN EIGHTY TWO
LONDON SOUTH EAST ENGLAND
THUNDERY SHOWERS BECOMING
MORE WIDESPREWIND
EASTERLY LIGHT TO MODERATE
TEMPERATURE TWENTY FIVE
DEGREES CENTIGRADE SEVENTY
SEVEN FAHRENHEIT

WHEN I WAS A CHILD I SPAKE
AS A CHILD I UNDERSTOOD AS
A CHILD I THOUGHT AS A
CHILD BUT WHEN I BECAME A
MAN I PUT AWAY CHILDISH T
HINGS FOR NOW WE SEE
THROUGH A GLASS DARKLY.

CODEWORD - "JANE AUSTEN"



WIN A BBC MICRO

A BBC microcomputer worth £299 is the prize in this month's competition set by Simon Dally

A puzzle editor once set a problem as follows: find a nine-digit-number which contains all digits from one to nine inclusive. The full number is exactly divisible by nine; knock off the right-hand digit and the number is exactly divisible by eight; knock off another digit and the result is exactly divisible by seven, etc – until you are left with one digit which is, of course, exactly divisible by one.

Pleased with his research, our editor declared that there was only one number which satisfied these conditions. But to his horror, a stream of abuse landed on his desk claiming there were several solutions. Your task is to check the puzzle out. Was the editor right, in which case what is the solution? Were the readers right, in which case how many solutions are there?

Entries should be sent to the Competition Editor, Acorn User, 53 Bedford Square, London WC1B 3DZ, to arrive by December 1



DEALER LIST

Official Acorn Dealer List in the UK

Acorn dealers stock and service the Atom computer, Acorn systems and Acornsoft software. Many also offer service facilities for the BBC micro and these are marked with an asterisk. The Acorn dealer not only sells computers and peripherals but provides vital customer support. Most have recently attended technical seminars in Cambridge to ensure that they deal effectively with customers' enquiries. In addition, Acorn supply dealers with specific test and diagnostic equipment to speed fault finding.

LONDON	DORSET	LINCOLNSHIRE	TYNE AND WEAR
Cambridge Sales E1 01-247 3455	Landsdowne Computer Centre	*Oakleaf Computers Grantham	0632-821924
Cambridge Radio 01-226 5392	Bournemouth	Microcom Computer Services	Newcastle-upon-Tyne 0632-761168
*Centre of Soundwill 01-727 0511	0202 23776		
*Group 70 E18- 01-505 7224			
*Micro Store SW3 01-580 5000			
*Off Records SW11 01-223 7730			
Paul Electrical SW20 01-542 6546			
PAJ Rental Ltd NW4 01-368 0572			
REW West East Video Centre SW1			
01-240 23967			
RA Bailey Ltd SE26 01-693 1818			
*Technopak Ltd NW10 01-723 0233			
The Video Palace W8 01-937 8587			
BIRMINGHAM	GLOUCESTERSHIRE	WEST MIDLANDS	WARRICKSHIRE
Quality Radio & Television Co B14	*Empire Ltd Cheltenham 0242 584343	A E Chapman & Co Old Hills Ltd	Carwell Rugby 0788 65275
021-444 2889	Independent Computer Consultants	Cradley Heath	
Typewriter Centre (Edington) B23 022-341 0185	Tewkesbury	D F Gibbs Ltd Coventry 0203 87432	
Typewriter Centre (Head Office B5	0684 298033	H & H Business Systems	
021-622 52857		Walsall	
Typewriter Centre (Dudley Road) B18		Richard Morris (Electrical) Ltd Walsall	
021-455 9111		021-553 7606/7	
Typewriter Centre (Kings Heath B14)		Ibek Systems Coventry 0203 661162	
021-444 7349		Micrologic Ltd	
AVON	HAMPSHIRE	Halesowen	
*Microstyle Bath	*Empire Ltd Colchester 0206 865926	021-529 8036	
025-334659		Richard Morris (Electrical) Ltd Walsall	
BEDFORDSHIRE	HEREFORDSHIRE	021-429 1161	
*Broadway Electronics	Kempson's Hereford 0432 3480	Taylor Wilson Systems Ltd Solihull 05654 6192	
0234-213639		Typewriter Centre Sutton Coldfield	
BERKSHIRE	HERTFORDSHIRE	021-355 6789	
*Windsor Computer Centre	*Comshop Ltd New Barnet	Typewriter Centre Sutton in Ashfield	
Windsor	*Computer Plus Watford	021-355 6789	
07535-58077	H F Shefford Ltd Abots Misenden	Typewriter Centre Tipton	
BUCKINGHAMSHIRE		021-355 6789	
A L Wheeler Ltd Great Missenden	0923 33927	Typewriter Centre Sutton Coldfield	
024-06 2560		021-355 6789	
*Tarcare Ltd Wendover	0927 77 63184	Typewriter Centre Tipton	
0296-623915	Intelligent Artifacts Ltd	021-355 6789	
Hi-Vu Electronics	Royton	Typewriter Centre Tipton	
Wolverton	0238 207689	021-355 6789	
0908 312808	*Tek Systems Ltd	Typewriter Centre Tipton	
CAMBRIDGESHIRE	Stevenage	021-355 6789	
*Ardon Personal Computers	0438 56385	Typewriter Centre Tipton	
Peterborough		021-355 6789	
0733-4776		Typewriter Centre Tipton	
*Cambridge Computer Store		021-355 6789	
Cambridge		Typewriter Centre Tipton	
0223-65334		021-355 6789	
*Control Universal		Typewriter Centre Tipton	
Cambridge		021-355 6789	
0223-385757		Typewriter Centre Tipton	
CHESTER		021-355 6789	
Bellard Electronics Ltd		Typewriter Centre Tipton	
Upton		021-355 6789	
0244-380123		Typewriter Centre Tipton	
*Northern Computers		021-355 6789	
Warrington		Typewriter Centre Tipton	
0298-35110		021-355 6789	
CLEVELAND		Typewriter Centre Tipton	
*Customised Electronics		021-355 6789	
Ltd		Typewriter Centre Tipton	
Middlesbrough		021-355 6789	
0642-247727		Typewriter Centre Tipton	
CORNWALL		021-355 6789	
Brecon & Bovey		Typewriter Centre Tipton	
Carbuncle		021-355 6789	
0209 712681		Typewriter Centre Tipton	
Microtest Ltd Bodmin		021-355 6789	
0208 3171		Typewriter Centre Tipton	
DERBYSHIRE		021-355 6789	
*Damon Micro Centre		Typewriter Centre Tipton	
Derby		021-355 6789	
0322-380085		Typewriter Centre Tipton	
*First Byte Computer		021-355 6789	
Systems Ltd Derby		Typewriter Centre Tipton	
96-365280		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616		Typewriter Centre Tipton	
LEICESTERSHIRE		021-355 6789	
*D A Computers		Typewriter Centre Tipton	
Leicester		021-355 6789	
0533 549407		Typewriter Centre Tipton	
Percy Lord & Son Ltd		021-355 6789	
Wigston		Typewriter Centre Tipton	
0533 78903		021-355 6789	
DEVON		Typewriter Centre Tipton	
*8+8 Bytes Ifracombe		021-355 6789	
0271-62801		Typewriter Centre Tipton	
Devon Computers		021-355 6789	
Paginton		Typewriter Centre Tipton	
0803-526303		021-355 6789	
J.A.D. Integrated Services		Typewriter Centre Tipton	
Plymouth		021-355 6789	
0752 62616			

WEST OF SCOTLAND

BBC & ATOM DEALER AND SERVICE CENTRE

SOFTWARE

Acornsoft Bug Byte Program Power also 30 Golf Fruit Machine Dodgems
Send SAE for full list

MONITORS PRINTERS

A selection on display A

A selection on display A-B upgrades carried out
also disk and Econet interfaces fitted

Acornsoft Bug Byte Program Power also 30 Golf
Fruit Machine Dodgems
Send SAE for full list

WEST COAST PERSONAL COMPUTERS

47 Kyle Street

AYR

Tel 0292 (285082)



Colossal Adventure: The classic main-frame game "Adventure" with all of the original treasures and creatures plus 70 extra rooms!

Adventure Quest: From the Great Forest; up Orc Mountain; through caves, desert, swamp, fire, lake and bleak moorland on an epic quest to defeat Tyranny.

Dungeon Adventure: NEW! The dungeons of the Demon Lord have survived His fall. Can you acquire their treasures first?

Each Level 9 adventure is packed with puzzles and has over 200 individually described locations - a game could take weeks to complete! Only data and code compaction allow us to provide so much.

Each adventure requires 32K of memory & costs £9.90 (including VAT and P&P).

Send order, describing your computer, or a SAE for full details to:

LEVEL 9 COMPUTING

229 Hughenden Road, High Wycombe, Bucks

INDEPENDENT NATIONAL USER GROUP FOR THE BBC MICRO



REGISTERED REFERRAL CENTRE FOR THE BBC PROJECT

DEVOTED EXCLUSIVELY
TO THE BBC
MICROCOMPUTER

BEEBUG FOR THE BBC MICRO

BRITAIN'S LARGEST SINGLE-MICRO USER GROUP

IF YOU OWN A BBC MACHINE, OR HAVE ORDERED ONE, OR ARE JUST THINKING ABOUT GETTING ONE, THEN YOU NEED BEEBUG. BEEBUG runs a regular magazine devoted exclusively to the BBC Micro (10 issues per year).

Latest news on the BBC project. What you should know before you order a machine. New program listings, regular advice clinic, and hints and tips pages in each issue.

April Issue: 3D Noughts and Crosses, Moon Lander, Ellipse and 3D Surface. Plus articles on Upgrading to Model B, Making Sounds, and Operating System Calls.

May Issue: Careers, Bombers, Chords, Spiral and more. Plus articles on Graphics, Writing Games Programs, and Using the Assembler.

June Issue: Maztrap, Mini Text Editor, Polygon; plus articles on upgrading, The User Port, TV set and Monitor review, Graphics Part II, More Assembler Hints, Structuring in BBC Basic, plus BBC Bugs.

July Issue: BEEB INVADERS and other programs - plus articles on using the Teletext mode, BBC cassette bugs fix, Software Review, using user defined keys. More on structuring in Basic. Using the User Port, and many hints and tips.

September Issue: Games Programs - higher/lower and Hangman. Articles on Beebugging programs, a safe verify; New User Guide Errata; Creating and moving multi-colour characters; Logic on the Beeb; String Search Program; Ideas on Colouring and Shading; Acorn's ROM Replacement Change; plus much more.

Membership: Send SAE for information or;
6 months - £4.90 Send £1.00 and A4 SAE for sample.
1 year - £8.90 (Overseas yearly membership only. Europe £15.00)

CURRENT MEMBERSHIP
EXCEEDS 10,000

October Issue: Program Features: Alien Attack; Calendar Generator; Union Jack; Memory Display Utility. Plus articles on Beebugging; Improving Key Detection; Acorn Press Release on O.S.H.2. and Issue II Basic; The Tube and Second Processor Options; or New Series for less experienced users; and Software Reviews.

BEEBUG not only bring you 10 Magazines a year (now 36 concentrated pages) but provides two other invaluable services.

A MEMBERS' SOFTWARE LIBRARY and an EXTENSIVE DISCOUNT SCHEME on products for the BBC micro.

MEMBERS SOFTWARE LIBRARY

A growing range of software is available to members from £3.50 per cassette (including VAT) e.g.

GAMES 1: STARFIRE (32k) Starwars type game with excellent sound and graphics.

GAMES 2: MOON LANDER (16k) 3D NOUGHTS & CROSSES (32k)

GAMES 3: SHAPE MATCH (16k) MINDBENDER (16k)

GAMES 4: MAGIC EEL (32k)

UTILITIES 1: DISASSEMBLER (16k) **REDEFINE (16k)** (Create your own graphics characters)

MINI TEXT EDITOR (32k)

APPLICATIONS 1: SUPER PLOT (32k)

Note: This software is only available to members at these prices. For further details of our software library, and how to order cassettes... JOIN BEEBUG.

Make cheque to BEEBUG and send to:
BEEBUG, Dept. 13, 374 Wandsworth Road.
London SW8 4TE

For editorial material send to: The Editor, BEEBUG, P.O. Box 50, St. Albans, Herts AL1 2AR

ESSEX & SUFFOLK

SUDSBURY
COLCHESTER
CLACTON-ON-SEA

CHELMSFORD

LONDON



YOUR LOCAL ONE STOP COMPUTER SHOP

**ACORN • APPLE • ATARI • DRAGON • NEC-TANDY •
TEXAS • INSTS • VIDEO • GENIE
PLUS
PRINTERS • DISK DRIVES • PERIPHERALS • BOOK •
SOFTWARE etc**

Acorn

Introduction to Basic Course by Brian Lloyd £19.95
30 Acorn games on cassette £9.95



Full range of ACORN SOFTWARE and ACORN ACCESSORIES and PERIPHERALS

Come and browse at our COLCHESTER DEMONSTRATION CENTRE or at your local EMPRISE retail store.



BBC

"A" and "B" machines now in stock UPGRADE kits FUTURA GAMES

Software from Acorn Program Power etc exclusively from EMPRISE
Futura Range

Games pack 1 UFO invasion, Corridor of Lasers, Robot Chase.

Games pack 2 Alien Star Fighter, Missile launch, Zayon alt each
pack costs just £5.95 inc. VAT (trade enquiries welcome)

Telephone for details of our Mail Order Computer Software Club

EMPRISE



CALL US
NOW

(0206)

865926



58 EAST STREET
COLCHESTER ESSEX
CO1 2TQ
TEL (0206) 865926

Also branches at:
CHELMSFORD TEL (0245) 356834
SUDSBURY TEL (0787) 310110
CLACTON TEL (0255) 431296



Function key programs

When developing programs on the BBC microcomputer it is helpful to have the function keys programmed to give frequently used commands. Everyone has their own favourites, such as RUN, LIST07 LIST00, LOAD", CHAIN", AUTO, and for the break key, OLD – but some are not.

Above key 0 on my computer it just says LIST, but this is actually composed of a number of commands. Select mode 6, change the background colour to blue – giving the effect of individual lines being separated by black lines as seen on BBC's Computer Programme – set paged mode (CTRL N), add an extra carriage return and then list the program.

The extra carriage return gives a total of three lines above the first line of the program so if you want to look at the first page of a long program and press ESCAPE, you do not lose the first line off the top of the screen.

Some explanation is also needed for keys 4 and 5, and along with those you will need to refer to lines 120 to 140 of the setting-up program. When you want to SAVE a program you need to specify a filename (unlike LOAD and CHAIN) which makes using a function key a little awkward.

My first idea was to put SAVE" on to a function key and then add the name and close the quotation marks from the keyboard. I then tried having SAVE N\$M on a key and declaring the name by typing N\$ = "FRED" or whatever. The problem here is that N\$ is a dynamic variable and disappears as soon as you play around with the program.

I finally hit on the idea of storing the name in a free chunk of memory in the workspace below the program and accessing it by using string indirection.

So from the initialisation program

```

10 *KEY0MODE6;MVDU19;4;0;:MIN:ML.:M
20 *KEY1RUN;M
30 *KEY2LIST07;M
40 *KEY3LIST00;M
50 *KEY4$&DFO="
60 *KEY5SAVE$&DFO;M
70 *KEY6LOAD"";M
80 *KEY7CHAIN"";M
90 *KEY8VDU12,23;12;0;0;0;:M
100 *KEY9AUTO
110 *KEY10OLD;M
120 INPUT N$
130 IF N$="" THEN N$="PROG"
140 $&DFO=N$
```

Ten ideas for function keys

or from the keyboard you can set up the filename and leave it until you move on to another program.

Thus to save a program twice and then rewind the tape consists of: press key 5, start the recorder, press RETURN, key 5, RETURN, and then do a ".RETURN" (an abbreviation for *CAT).

Having rewound the tape it is possible to do a catalogue to verify the program, and when finally rewound, press ESCAPE to turn off the motor.

This explains the lack of *MOTOR1 and *MOTOR0 from the function keys – it is so easy to type in ".RETURN" and then press ESCAPE, that it is not worth using up function keys on it.

But a word of warning. Since I have chosen &DFO which is just below the program at &E00, if you try to use a filename of more than 15 letters you will overwrite the

beginning and get a "Bad Program" prompt!

The only other key that needs any explanation is key 8. This clears the screen (VDU12) and then you can use the advanced graphics call VDU 23, 0 to tell the VDU driver chip, which is programmable, that video RAM starts at page zero.

This has the effect of displaying a 'bit-map' of zero page, all the workspace and some of the program area depending on which mode of graphics you are in. But it only works effectively in a two-colour mode (not mode 7) and is most easily visible with white on a blue background.

It can be set up by pressing key 0, ESCAPE (if it's a long program to be listed) and then key 8. This view of the computer workings is not only fascinating but also a useful diagnostic aid.

Paul Searle

EDITING FROM TOP TO BOTTOM

Editing programs on the BBC microcomputer is easier if you remember that when the text cursor is at the bottom of the screen and you want to edit a line in the upper half, it is quicker to move the cursor down rather than up.

As it goes off the bottom of the screen it reappears at the top. Indeed if you have three or

four consecutive lines to edit it is worth pressing the RETURN key until the first line to be edited is at the top of the screen. To reach it then only requires a single press on the cursor down key.

Having finished editing, you press RETURN, and this brings the next line to the top of the screen and again only needs a single cursor down to reach it.



FIGHTING BACK

Struggling with a family of computer maniacs is no joke, but **Mrs Ronnie Rowsell** finally gets some joy

The day after the micro had arrived, a man came to repair the television. The rest of the family were greatly cheered, but I wasn't bothered, because the mono set was the only one I had access to.

A few days later the tribe organised some sort of rota system for using 'Brains' (the chosen

name). The system and the machine seemed to both work smoothly. I was secretly becoming interested in joining in - my curiosity was getting the better of me. But I couldn't use the thing because I didn't know how to and it would take too long for a 'thick' housewife to learn.

During the day I would often dust the keyboard. That may sound rather boring, but at least I had no one telling me that it wasn't my turn, or that they wanted to show me something.

I noticed that the keys were positioned in exactly the same way as the typewriter I had tried so hard

to master when I was at college. So I spent the rest of the week pretending to type 'Now is the time for all good men to come to the aid of the party', the only thing I had ever managed to type at speed.

While having breakfast a week later it dawned on me that everyone in the house knew how to work the computer but me. They had such bags around their eyes from programming all night long that they looked like a family of pandas. It was time I did something to learn.

I thought about this computer problem a great deal, and it wasn't until I was saying goodbye to the girls at the school gate that I decided what had to be done. By 9.15, I was back at home sitting in front of Brains, saying in a very determined voice: 'To hell with the washing up, cleaning, cooking, shopping, ironing and other such mundane chores'.

I was going to do something completely different today. I was going to teach myself how to use this dreaded computer. With all the confidence in the world, I cracked my fingers like a cinema safe-breaker, switched on the plug sockets, and turned on the television.

Then I hit snag number one. The screen was a mass of fuzz, with matching sound. I realised my task wouldn't be easy, so I did what every other stay-at-home housewife would and pressed all the buttons on the keyboard. Surprisingly, nothing happened. Being the level-headed, quick-thinking person that I am, I decided to read the instruction manual.

I had a slight problem here because all computer books look the same. So I started at the top of the pile and worked my way through the 20 or so books littering the floor around the computer. The first time through I had no success at all. I was expecting the book to have printed on the cover: 'I am the book you are looking for'. It didn't so I went through the pile again, more thoroughly, and hey presto: *User Guide!* I looked through the index and realised this was my kind of book. It even had a section on how to unpack it properly. But as it had already been unpacked I didn't

read that section, but I made a note of the page number in case we ever bought another one.

The next section was called 'Getting going' and half way down the page I learned of the on/off switch on the back of the computer. I pressed it with some care and completely defuzzed the screen.

The I hit snag number two. What in the world did BBC Computer 32K mean? At this point I decided to stop to have a cup of coffee as it was now 10.30, the house was still a pigsty and all I had done was to switch the silly thing on.

Over coffee the guide began to give up its mysteries to me. I learned that any of the keys could be pressed while the computer was turned on without fear of my being struck by lightning. Things could be rubbed out by pressing the delete button, an important feature when the typist is me.

I spent the rest of the morning filling the screen with, you've guessed it, 'Now is the time for all

'What in the world did BBC Computer 32K mean?'

good men to come to the aid of the party'. I had not lost my touch.

After a short break to flit through the house with the old vacuum cleaner and feed the starving children home for their lunch, I returned to the more interesting subject of the day.

Switching on was now a mere formality, and once again I was face-to-face with BBC Computer 32K. I wanted to load the *Welcome Tape* as I knew it held some nice programs illustrating the capabilities of this machine.

Following the instructions in the book I tried to get it to print on the screen. 'Adjust your volume control until a message is printed on the screen telling you that the setting is correct', said the guide. But I couldn't get it. I tried and tried but with no success and it was at this point that I realised I really did need the help of someone more qualified in operating computers.

I decided to, sadly, call it a day. But instead of admitting defeat to

the others I would revel in my achievements. I would make myself a badge to tell the world that I switched on the BBC micro and lived. That way, if my husband had any heart, he would fall over himself to teach me the things he knew.

I went to pick the girls up from school and all my friends gathered round, intrigued by my badge. But I wasn't telling them anything about playing on computers all day and not having made the beds yet.

I approached the girls to ask them if they could help me learn in secret, then surprise Daddy at the end of the week. No, they said, they were too busy playing with their friends to stop and teach me anything. So it would have to be the great master himself.

The minute my husband arrived home from work the girls spilt the beans on the silly badge I was wearing and how I had tried to persuade them to give me lessons in secret. So I threw the badge at him, followed by the burdens of my day.

He smiled a few times but never once called me a silly girl or any of those other things that loving husbands call their wives. When I finally wound up with 'and I haven't even had time to make the beds', he took me by the hand, turned on the computer, replaced a wire that he assured me was plugged in when he went to work that morning, and as if by magic there was the message I had nearly torn my hair out for earlier. Then he returned my slightly crumpled badge to its rightful place, and we went to eat dinner.

Things have definitely changed now. I have my own time on the computer in the evenings, with personal tuition from my husband. This enables me to practise during the day what I have learned the night before. And I still have time to make the beds!

I can take part in breakfast-time discussions. I feel part of the family once again. I read computer books in bed now instead of Catherine Cookson.

I have to admit that I do find some of them rather boring, but it makes living with a computer fanatic and his protégés that much easier.

Machine talk

►continued from page 14

language programs, comments are essential. They help ensure that the programmer can return to a program later and understand what was designed.

In the program of figure 2 we might incorporate the following comments:

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65 \ ASCII for A
170 STA 15750 \ screen location
180 RTS \ return to BASIC
190 ]
200 END

```

In a Basic program we often represent numeric values by giving them a variable name - more properly, we would say that we use named variables to which we assign specific values.

Labels can be used in assembly language programs to perform a corresponding function. In our simple program, a label might be used to refer to the screen location to which we shall write 'A'. This also provides a tidier solution to the problem of referring to the different locations required for the example to run on model A and model B machines. The program could then become:

```

100 REM Assembly language program
110 REM sub 32134 on Model B for 15750
115 SLOC=15750
120 REM Put an 'A' on the screen
130 CLS
140 P%=&1500
150 [
160 LDA #65 \ ASCII for A
170 STA SLOC \ screen location
180 RTS \ return to BASIC
190 ]
200 END

```

There are many more features of the assembler that are important to the assembly language programmer. Next month we will look at other features of the assembler, including positioning your program in memory.

LET ACORN SOFTWARE OPEN THE DOORS TO YOUR IMAGINATION

BBC Microcomputer or Acorn Atom

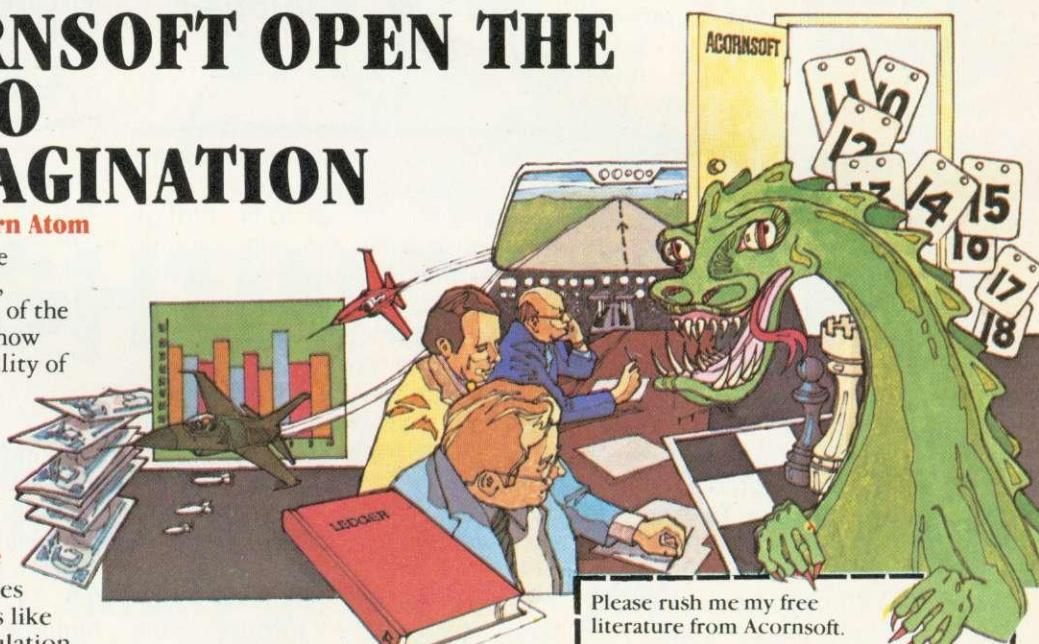
Acornsoft is the software division of Acorn Computers, designers and manufacturers, of the BBC Micro and Atom. We know better than anyone the capability of the machines, we know how to get the very best from the hardware. And we have produced a range of exciting games, exacting business and useful household software.

The Biggest Range Available

Acornsoft software ranges from authentic arcade games like Snapper to Algebraic Manipulation to Desk Diary to other languages like FORTH and LISP. Striking colour, amazing sound effects and powerful graphics are all used to the full. And it does not stop there. There is a complete range of manuals, accessories and plug-in ROMs.

Free Brochures

Just clip the coupon or write to us and we will rush our catalogue absolutely free. Can't wait for the post



ring 01-930 1614
now! Don't delay -
do it today. Let Acornsoft help you
get the best from our machine and
open the doors to your imagination.
Acornsoft and Atom are registered
trade marks of Acorn Computers Ltd.

ACORN SOFTWARE

4A Market Hill,
CAMBRIDGE CB2 3NJ.

Please rush me my free
literature from Acornsoft.

Atom BBC Please tick

Name _____

Address _____

Postcode _____

P J FOR COMPUTERS & COMPUTING IN SURREY EQUIPMENT LTD

The BBC and Acorn dealer for Surrey. If you are a business user or hobbyist we give a full and expert back up to ALL our sales. Call in or ring for a frank discussion on computers and computing and what we can do for You.

**Agents and stockists for:
Acorn, BBC, Sharp, Complete
Tandy range, SD, Cumana
Disk Drives, Epson, VIC,
Dual purpose colour
TV/RGB Monitor @ £279.90;**

**Software and hardware accessories
and expertise all supplied**

**3 BRIDGE ST., GUILDFORD,
SURREY (0483) - 504801**

RMK
Electronics Ltd



NOW IN STOCK

**JOYSTICKS – BBC COMPATIBLE
BBC UPGRADES – Parts or Service
CASSETTES – C12 @ 50p each
PRINTERS – from £110
ACORN SOFTWARE – Products for ATOM & BBC
LEADS – Printer, Cassette, etc**

TECHNICAL DEPARTMENT FOR SERVICE AND DESIGN

**RMK ELECTRONICS LTD
First Floor, Hinton House, Station Rd,
New Milton, Hants. BH25 6HZ
Tel: 0425-616110**

Timeshare your Colour Monitor with the Family

Colour TV-RGB-PAL Video

£299 inc. vat

PortaTel LUXOR

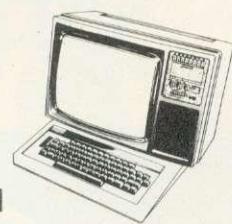
TV Receiver

14" Colour Monitor

RGB3711

BBC Micro lead included

Excellent resolution, geometry



A recent addition to the PORTATEL Monitor range is the RGB 3711. Priced at just £299 inc. VAT, it complements the Home Computer perfectly being suitable as the second domestic TV and an excellent resolution Monitor.

Based on Sweden's LUXOR range of quality Colour Televisions it has front panel switching to TTL level RGB signals with positive or negative synchronisation, or PAL encoded composite Video at 1 volt, 75 ohms. Included is a 6 pin DIN connector for use with the BBC Micro 'B' model.

PortaTel conversions limited

**25 Sunbury Cross Centre, Staines Road West,
Sunbury-on-Thames, Middlesex. TW16 7BB
Telephone: Sunbury-on-Thames 88972**

EXTENDED COLOUR-FILL GRAPHICS

E.C.F.G. GIVES YOU A CHOICE OF

!! 4 BILLION + !!

**SHADES FOR TRIANGLE FILLING
IN BBC MODES 0,1,2,4 & 5**

- * PLOT 81 and 85 commands for triangle-filling have been adapted to use the ECFG fill-shade currently selected by means of user-friendly commands. GCOL is still used for line colours
- * Easy choice of 17, 289 & 6561 preset colours between those normally available in 2, 4 & 16 colour MODEs. Further options include colours, angles, spacings & widths of cross-hatch etc.
- * ECFG commands can be used in BASIC, typed from the keyboard, accessed in Assembler, or in future BBC Micro languages. ECFG is MOS-adaptive, and proven with versions 0.1 ~ 1.2
- * Bootstrap from cassette rapidly builds an ECFG module at a RAM address pre-defined by PAGE, which is then automatically increased by &200 to allow immediate LOADING of programs etc.

Price : £10 inc : Mail Order only

GAELETT (ECFG)

44 EXETER CLOSE, STEVENAGE, HERTS. SG1 4PW.

(Tel. Stevenage 51224)

THERE'S ONLY ONE THING THAT CAN HELP YOU TO GET THE BEST OUT OF YOUR BBC MICRO



The only non-commercial independent national BBC Microcomputer user group

Please enrol me as a member of **LASERBUG**.

I enclose a cheque/PO for £12.00 for 12 months subscription.

Name.....

Address.....

Tel.....

Please make all cheques/PO payable to LASERBUG and send to

4 Station Bridge Woodgrange Road Forest Gate London, E7 0NF



INDEX OF ADVERTISERS

A & F	21	Hopesoft	39
Acorn Computers	i.f.c.	Laserbug	80
Acorn Soft	18/78	Leasalink	i.b.c.
Addison-Wesley	28	Level 9	73
BBC Basic	67	MicroAge	36
Beebug	73	Micro Management	47
Bits & Bytes	39	Micro Power	49 / o.b.c.
BNB/Newark Video	18	Oakleaf	34
Broader Horizons	45	Off Records	59
Cabel	69	Personal Computers	73
C.J.E	72	P. J. Equipment	79
Computer Concepts	50	Portatel Conversions	79
Control Universal	59	Q-Tec	34
Cumina	15	Reader Offer	43
Eduquest/Windsor	7	R. M. K	79
Electroniquip	67	Sinclair IJK	65
Eltec	18	Software for All	5
Emprise	74	3D	39
Galeset	79	Technomatic	9
Gemini	25	Timedata	39
Gollem	34	Windsor Computer Centre	67

BIGGEST AND BEST



We're best because we're biggest. The biggest Acorn Distributor you can get. We've got the biggest range of hardware, software, add-ons, books, stationery, peripherals, monitors and printers. And the most efficient distribution facilities in the country.

Don't try the rest—come to the best!

LL
LEASLINKVIEWDATA
LIMITED

230/6, Derby Road, Stapleford, Nottingham NG9 7BL Tel: Nottingham (0602) 396976

PROGRAM POWER MICRO POWER

BBC ALIEN DESTROYERS

NEW-DEVASTATING MODEL B (or 32K MODEL A) GAME
FROM BRITAIN'S LEADING SOFTWARE HOUSE!



Sensational, high speed program incorporating brilliant use of colour graphics and sound. 48 strong alien fleet of 3 different types plus Mothership scoring mystery bonus. Choice of 6 alien speeds and 3 bomb speeds. Vertical, angled and exploding missiles. Options to replace defences and suppress new fleet advances. Bonus bases awarded each new sheet. Scoring according to overall difficulty level plus end of game ranking of top scores.

This program also has many unique extras including "Battle Analysis" showing numbers of aliens shot down, how many Motherships destroyed, number of sheets cleared, shots fired, percentage hits and bases lost.

If you needed a reason to upgrade to 32K, now you have it!!!

ONLY
£6.95

OTHER BBC PROGRAMS

MODEL A or B

CHESS (32K). Our excellent machine code program—now with superb MODE 1 graphics. Six skill levels, play back or white, illegal moves rejected, 'en passant', castling, 'take-back' of moves, and display of player's cumulative move time. Options include Blitz Chess, where you must move in 10 seconds, set-up of positions for analysis, replay of a game just played and saving of part completed game on tape. On loading a 1972 Spassky/Fisher game can be replayed. £6.95. Model A version still only £4.95. Graphics Upgrade exchange. £2.50.

ADVENTURE. All the excitement, intrigue and frustration of a main-frame adventure. Explore the tortuous forests, dark caverns and castle dungeons. Beware the maze of twisting tunnels and the desert wastelands. Outwit the predators. Rescue the Princess and carry off the treasures. Great skill and imagination are required to play this excellent game. You may never exhaust the possibilities. YES—this is our highly acclaimed ADVENTURE for the Atom!!

Other NEW 16K Titles: £8.95 **FILER** (Database). £5.95 each—**ASTEROID BELT**, **SEEK** (Adventure), Junior Maths Pack, **Where** (UK Geography). £4.95 **REVERSI I**, £3.95 **Mastermind** (2-way).

All programs now available from good dealers.
We pay 20% Royalties on BBC, Spectrum, Dragon and Atom programs.

AUTHORISED BBC, ACORN AND DRAGON DEALERS

Special Offer—Deduct £1 per cassette when ordering two or more.

MODEL B (or 32K Model A)

GALACTIC COMMANDER (Aptitude Test). Nine phase test for aspiring Space Vehicle Commanders. Begin by separating your craft from the command module and landing under acceptable gravity conditions. Then **GRADUATE** through combinations of lower gravities, circulating command modules, defended planets (some with homing missiles), and eventually to underground landing sites in cave systems with unfriendly inhabitants. The program presents a real challenge. The use of machine code and high-res. graphics give beautifully smooth action. Very good sound £6.95.

FOOTER. Exciting Advance in Computer Games. This is a TWO PLAYER football match, masterfully presented in HIGH-RES graphics. Out-run and out-dribble your opponent and finally blast the ball into the net. You will be amazed at the realism of this program! Newly designed graphics handling routines give a totally smooth movement to both player and ball. (See the players' legs in running action!) £6.95.

Other NEW 32K Titles: £6.95 each—**METEOR BATTLE**, **LASER COMMAND**, £5.95 each—**MARTIANS**, **CONSTELLATION**, £4.95 each—**REVERSI II**, **MAZE INVADERS**, **ROULETTE**. 'New Prices'—**TIMETREK** £6.95, **ELDORADO GOLD** £5.95.

PLEASE NOTE!

We now offer over 30 BBC and 60 Atom programs of the highest quality and at highly competitive prices. Order NOW or send for our full catalogue.



Please add 55p
order P & P
+ VAT at 15%



MICRO POWER LTD.
8/8a REGENT STREET
CHAPEL ALLERTON
LEEDS LS7 4PE.
Tel. [0532] 683186

PROGRAM POWER MICRO POWER